VOLUME TWENTY-THREE

AMERICAN JOURNAL OF PHARMACEUTICAL EDUCATION

FALL

THE OFFICIAL PUBLICATION OF
THE AMERICAN ASSOCIATION OF COLLEGES OF PHARMACY

NINETEEN HUNDRED FIFTY-NINE

AMERICAN JOURNAL of PHARMACEUTICAL EDUCATION

VOLUME 23 FALL, 1959 NUMBER 4

Published quarterly by the American Association of Colleges of Pharmacy, partially supported by the American Foundation for Pharmaceutical Education, and printed by the Washington State University Press at the Washington State University, Pullman, Washington. Subscription price $5.00. Single copies $1.25. Second class postage paid at Pullman, Washington. Postmaster: Undelivered copies should be returned to American Journal of Pharmaceutical Education, School of Pharmacy, Washington State University, Pullman, Washington.

Editorial office: School of Pharmacy, Washington State University, Pullman, Washington. Address all communications concerning manuscripts to the Editor. Instructions to authors will be found in the announcement section of each Winter issue. Business office: College of Pharmacy, University of Illinois, 833 South Wood Street, Chicago 12, Illinois. Address all subscriptions and other business communications to the Business Manager. All new subscriptions begin with the Winter issue. The journal assumes no responsibility for statements made by authors.

AMERICAN ASSOCIATION OF COLLEGES OF PHARMACY -- 1959-1960

OFFICERS

CHARLES W. BLIVEN, PRESIDENT ..... GEORGE WASHINGTON UNIVERSITY
HENRY M. BURLAGE, VICE PRESIDENT ..... UNIVERSITY OF TEXAS
GEORGE L. WEBSTER, SECRETARY-TREASURER ..... UNIVERSITY OF ILLINOIS
HAROLD G. HEWITT, CHAIRMAN, EXECUTIVE COMMITTEE ..... UNIVERSITY OF CONNECTICUT

EXECUTIVE COMMITTEE*

HAROLD G. HEWITT, CHAIRMAN ..... UNIVERSITY OF CONNECTICUT
LOUIS W. BUSSE, 1960 ..... UNIVERSITY OF WISCONSIN
EWART A. SWINYARD, 1960 ..... UNIVERSITY OF UTAH
GEORGE P. HAGER, 1961 ..... UNIVERSITY OF MINNESOTA
KENNETH L. WATERS, 1961 ..... UNIVERSITY OF GEORGIA
LOUIS C. ZOPF, PAST PRESIDENT ..... STATE UNIVERSITY OF IOWA
CHARLES W. BLIVEN, PRESIDENT ..... GEORGE WASHINGTON UNIVERSITY
HENRY M. BURLAGE, VICE PRESIDENT ..... UNIVERSITY OF TEXAS
GEORGE L. WEBSTER, SECRETARY-TREASURER ..... UNIVERSITY OF ILLINOIS

HONORARY MEMBER

ZADA M. COOPER ..... VILLISCA, IOWA

---

* Specification of a year after the name of a member of the Executive Committee indicates the year in which the term of office terminates at the time of the annual meeting.

CONTENTS

AUTHORS IN THIS ISSUE

Melvin R. Gibson, Professor of Pharmacognosy, Washington State University; Editor of this journal (Ph.D. University of Illinois)

Joseph B. Sprowls, Dean, School of Pharmacy, Temple University (Ph.D. University of Colorado)

Louis W. Busse, Associate Dean, School of Pharmacy, University of Wisconsin; Member, AACP Executive Committee (Ph.D. University of Wisconsin)

F. P. Cosgrove, Assistant Professor of Pharmacy, University of Texas (Ph.D. Ohio State University)

Patrick F. Belcastro, Assistant Professor of Pharmacy, Purdue University (Ph.D. Purdue University)

Albert M. Mattocks, Professor of Pharmacy, University of Michigan (Ph.D. University of Maryland)

Kenneth E. Avis, Associate Professor of Pharmacy, Philadelphia College of Pharmacy and Science (Sc.D. Philadelphia College of Pharmacy and Science)

Dwight L. Deardorff, Professor of Manufacturing Pharmacy, University of Illinois (Ph.D. University of Iowa)

P. W. Wilcox, Director, Pharmaceutical Research and Development, Merck Sharp and Dohme Research Laboratories (Sc.D. Philadelphia College of Pharmacy and Science)

L. A. Strait, Professor of Biophysics, University of California (Ph.D. University of California)

L. D. Tuck, Associate Professor of Chemistry and Pharmaceutical Chemistry, University of California (Ph.D. University of California)

F. M. Goyan, Professor of Chemistry and Pharmaceutical Chemistry, University of California (Ph.D. University of California)

George P. Hager, Dean, College of Pharmacy, University of Minnesota; Member, AACP Executive Committee (Ph.D. University of Maryland)

W. Lewis Nobles, Professor of Pharmacy and Pharmaceutical Chemistry, University of Mississippi (Ph.D. University of Kansas)

Edward P. Claus, Dean, Division of Pharmacy, Ferris Institute (Ph.D. University of Pittsburgh)

Joseph D. McEvilla, Associate Professor of Pharmacy Administration, University of Pittsburgh (Ph.D. University of Pittsburgh)

R. V. Evanson, Associate Professor of Pharmacy Administration, Purdue University (Ph.D. Purdue University)

Joseph H. Kern, Associate Professor of Pharmacy Administration, Northeast Louisiana State College (Ph.D. Ohio State University)

Arthur C. Lytle, Jr., Assistant Professor of Pharmacy Administration, Ohio State University (Ph.D. Ohio State University)

Maynard W. Quimby, Professor of Pharmacognosy and Botany, Massachusetts College of Pharmacy (Ph.D. Cornell University)

CHARLES W. BLIVEN

SCHOOL OF PHARMACY, THE GEORGE WASHINGTON UNIVERSITY

PRESIDENT CHARLES W. BLIVEN: A BIOGRAPHICAL SKETCH*

MELVIN R. GIBSON

Born November 22, 1911, in Dakota City, Nebraska, the third of four sons of Leslie Sides and Mazie (Wingett) Bliven, Charles Watson Bliven spent his early life on a farm ten miles south of Sioux City, Iowa, a farm which is still in the family and operated by one of his brothers. Brought up in the healthy atmosphere of the rural Midwest, Charles Bliven reflects in his honest and friendly mien a background of solid American stock with its genesis in the pioneer spirit and its creed in Christian principles. Reverend Mr. Shaheen writes of Bliven that to this day

> . . . he is without failure, except for most urgent reasons, in his accustomed place in Saint Luke Church come Sunday morning.

Charles Bliven learned early of the need for Christian guidance and adherence to its principles.

Having completed his elementary school in a one-room country schoolhouse and his high-school education in Dakota City in 1928, Charles Bliven set out for Wayne, Nebraska, to begin his higher education at Wayne State Teachers' College, where chemistry proved to be his most rewarding course. Because of this new interest, coupled with a long-founded interest in the functioning of the one Dakota City drugstore, Charles decided to study pharmacy and entered the University of Nebraska College of Pharmacy in 1929. After two years at the University, he returned to his farm home to battle the problems of the drought and the depression during 1931 and 1932.

Through the encouragement of the faculty at Nebraska, Charles Bliven returned to the University in 1933 to complete his final year, during which time he supported himself by working at the Sumner Pharmacy in Lincoln. Dean Burt describes this phase as follows:

> . . . As a student he was industrious, dependable, and trustworthy. He obtained an education here at the University of Nebraska under a rather severe handicap of limited finances. Yet his experiences had a great deal to do with the development of his character and capabilities. . . . I consider him to be one of the outstanding representatives of our graduates.

After graduation in 1934 he stayed on at Nebraska to work for his master's degree in pharmacy with a minor in physiology and pharmacology. In 1934-35 he was a graduate assistant, in 1935-36 an assistant instructor.

Under the direction of Dr. F. S. Bukey, Bliven's research for his master's degree was on methods of testing enteric coatings. Also working on enteric

* The author is indebted to the following persons for supplying information for this article: Dr. W. Paul Briggs, Secretary and Executive Director, American Foundation for Pharmaceutical Education; Dr. F. S. Bukey, Control Chemist, Norden Laboratories, Lincoln, Nebraska; Dr. Joseph B. Burt, Dean, College of Pharmacy, University of Nebraska; Mr. F. Royce Franzoni, President, Z. D. Gilman Company, Washington, D. C.; Mr. Lewis E. Harris, President, Harris Laboratories, Inc., Lincoln, Nebraska; Dr. Cloyd H. Marvin, President Emeritus, The George Washington University; and Reverend Raymond Shaheen, Pastor, Saint Luke Evangelical Lutheran Church, Silver Spring, Maryland.

coating at that time was Miss Marjorie Bennett Brew, who, with a B.Sc. degree in home economics, was interested in the effect of diet on the disintegration time of enteric coatings. Charles Bliven and Marjorie Brew received their M.Sc. degrees from Nebraska in 1936. They were married June 5, 1938.

Graduate work beyond the M.Sc. degree was taken by Bliven at Nebraska during 1936 through 1938 and during a summer at the University of Michigan. Mr. Franzoni remembers the Michigan summer this way:

> Looking backward to 1936, my first impression of Charlie was that he was a purposeful and serious-minded student. This impression was heightened by my amazement that he could make a seven o'clock class in biochemistry every day in the week except Sunday and yet be unperturbed by the grind of carrying a full program of study in the intensive summer sessions. While he was in no sense a "grind" at his studies, Charlie did give first choice of his time to his studies and always seemed to have the day's assignments well prepared. His laboratory work in Dr. Blicke's organic pharmaceutical chemistry was precise, and his particular part of the lab desk was always neat and scrupulously clean. Charlie was most friendly and an interesting conversationalist, and I never knew him not to be able to see the brighter side of things.

From 1936 to 1938 Bliven was on the University of Nebraska staff, instructing one year in physiology and pharmacology and another year in pharmaceutical chemistry while instructors in these areas were on sabbatical leave. The years 1938-40 were spent as a pharmaceutical analyst for the George A. Breon Company of Kansas City, Missouri. In 1940 Bliven returned to teaching, joining the staff of the School of Pharmacy, The George Washington University, as an assistant professor of pharmaceutical chemistry. Dr. Briggs was then Dean of the George Washington School of Pharmacy, and he describes their meeting as follows:

> We first met, by letter arrangement, in St. Louis. After several hours of discussion Charlie agreed to join our staff at George Washington University in September, 1940. Our close friendship was developed from that brief mutual appraisal. For my part, it was just about the best evaluation I have ever made.

Professor Bliven became Ensign Bliven of the U.S. Maritime Service in November, 1942, and taught pharmacy in the Hospital Corps School, Sheepshead Bay, New York. His work there is described in the 1943 volume of this journal, pages 150-155. Bliven served as a lieutenant (j.g.) and lieutenant in the U.S. Navy from December, 1943, to March, 1946, assigned to Hospital Corps School, Bainbridge, Maryland; Naval Air Stations at Corpus Christie and Beeville, Texas; and the personnel division, Hospital Corps, Bureau of Medicine and Surgery. During his training he attended the National Naval Medical School's course in epidemiology. A member of the Navy reserve until 1953, Bliven resigned as lieutenant commander in that year.

After government service, Charles Bliven returned to collegiate activities as an associate professor at George Washington University. He was promoted to professor in 1948 and was acting dean 1946-1947; he has been dean of The George Washington School of Pharmacy since September, 1947.

Dean Bliven has been active in the AACP and its Conference of Teachers. He has served as secretary of the Section of Teachers of Pharmacy Administration (1950-51) and as vice chairman (1951-52). He was a member of the AACP Executive Committee (1955-57) and has served as the AACP delegate to the American Council on Education, the National Drug Trade Conference, and the House of Delegates of the A.Ph.A. He has also served as the AACP member of the General Advisory Committee of the Health News Institute.

He was elected to the AACP Vice Presidency in 1958 and succeeded to President at the Cincinnati meeting in August of this year.

At George Washington Dean Bliven has held the offices of treasurer and president of that institution's chapter of Sigma Xi. President Emeritus Marvin of George Washington describes his activities there as follows:

> Dean Bliven has had a remarkable career with us because of his friendliness, his understanding of men, his ability as a teacher, and his specialized work in research because he is able to get men to cooperate with him in carrying out the projects that he has. He truly has established himself in this University as few are able to do. He always is eager to advance a program which he espouses, and does so with discriminating judgment. He has worked well with the pharmaceutical leadership in this community as well as with the national offices. To this I need not attest, for the record shows for itself.
>
> We would find him, after years of having the privilege of working with him, as one of the fine leaders of this institution.

In close contact with the practicing pharmacists of Washington, D.C., and the surrounding area, Dean Bliven was elected president of the D.C. Pharmaceutical Association in 1953-54 and was selected by that group in 1957 as the Pharmacist of the Year. He has been a member of the D.C. Pharmaceutical Association Executive Committee since 1948. He also has been president of the City of Washington Branch of the A.Ph.A. and was vice president of the D.C. Interprofessional Conference. Mr. Franzoni has described the activities as follows:

> Charlie has been a most active participant in the affairs of both the A.Ph.A. City of Washington Branch and in the District of Columbia Pharmaceutical Association—in which he has held offices. He has the knack of analyzing a knotty problem and coming up with an acceptable and workable solution.

And this from Dr. Briggs:

> The local pharmacists depend upon him for guidance and he has long been on the D.C. Pharmaceutical Association Executive Committee. He served a term as president and about four years ago the Association put on a "This Is Your Life" presentation for Charlie. This was never done before or since for any other man.

In community activities Dean Bliven plays an active role. He has been a member of the Board of Trustees of the elementary school for ten years. He is president of the Citizens' Association and has been a member of its Executive Committee on several occasions. He is currently treasurer of a pack of Cub Scouts. He was an usher in Saint Luke Lutheran Church for several years and has taken an active part in the men's group. Reverend Mr. Shaheen writes:

> We are fortunate to claim him in our parish family, and what a good President he will make for your Association.

And from Dr. Briggs:

> He is a devoted husband and father. He is active in civic and church work, but far beyond these outward signs, Charlie lives every hour as a Christian man. If he has any personal fault, it would be his exaggerated sense of obligation and humility.

And from Dean Burt:

> I have never known him to try to shift responsibility to others, regardless of how difficult his assignments might be. He has a splendid personality, characterized by his great modesty and consideration of the rights of others. . . . I am sure that he has earned every recognition that has come to him, and I was particularly pleased to learn that his capabilities and talents had been recognized by his election as President of the AACP.

Dean Bliven's affiliations include membership in Sigma Xi, Rho Chi, Phi Lambda Upsilon, Omicron Delta Kappa, Alpha Sigma Phi, Kappa Psi, and

Alpha Zeta Omega (honorary). He is a member of the A.Ph.A.; an associate member of the American Society of Hospital Pharmacists; a member of the D.C. Pharmaceutical Association; and an honorary member of the Prince Georges-Montgomery Counties, Maryland, Pharmaceutical Association.

And what of Charles Bliven the man? Like many dedicated pharmaceutical educators, he is engaged mostly in the varied activities of the profession of pharmacy and the profession of teaching. He has two adopted children—John Leslie, 11, and Virginia Louise, 12. At home he spends many hours with his flowers, among which the gladioli are his chief interest. He leads a quiet, unostentatious life: Charles Bliven is a quiet, unostentatious man. But as Mr. Franzoni says:

> . . . Yet in the heat of debate or argument about pharmacy, the School or professional activity he demonstrates forcefulness combined with logical thinking.

With his students he seems to follow the pattern of his good friend and teacher, Dean Burt. He knows his students and can call them all by name. He knows their backgrounds and their problems. He knows their weaknesses and their strengths. He respects the profession of teaching and adds to that respect by his own actions.

Reverend Mr. Shaheen says:

> . . . His students speak of him with very high regard. On occasion I have met some of them in area drugstores who substitute as clerks. Then too I have also met some of the graduates. There is nothing except warmth and affection in their voices when they speak of him.

Dean Burt evaluates Dean Bliven as follows:

> As you know, I have very high regard for Charles Bliven. He is one of the most sincere persons I know and is perfectly honest.

From Mr. Harris:

> Charlie is one of the few men who apparently has no enemies. I have yet to talk with anyone about Charles Bliven who does not have something good to say about him. His faculty members and students have a deep respect for his knowledge and understanding.

From Dr. Briggs:

> Charlie is the finest example of a dedicated and honest man. He is slow to anger and patiently tolerant of everyone. He bears his own worries and problems in silence, but is quick to help others. . . . He never sulks and never feels sorry for himself—yet I know he has had ample provocation.
>
> . . . He is a strong minded man, who seeks advice from all sources, but makes his own decisions. I would just as quickly put my right hand in a meat grinder as try to change his personal judgment! And in twenty years I have never known him to take expedient or political action—his criterion is always "what is the honest and fair course."
>
> . . . Charlie has done a splendid job at the College, in spite of some very troublesome problems. In faculty, staff, students, library, morale—in every area—pharmacy at G.W.U. is far better now than ever before. (I wish I had been qualified to accomplish as much.) The students believe in him, and the administration has confidence in him.

This is Charles W. Bliven, President of the American Association of Colleges of Pharmacy. He is a man respected by all who know him, and is loved by those who know him best. As Dr. Briggs said, "You cannot say anything too good about him." He is a person of great kindness, who is conscious of the feelings of others. He is willing to recognize his responsibilities and is capable of handling them well. Charles Bliven will be a capable and respected President, for Charles Bliven is a capable and respected man.

ARTICLES

THE PHARMACIST'S ROLE IN PROMOTING THE HEALTH OF THE PUBLIC*

JOSEPH B. SPROWLS

Improvement of the curriculum is one of the continuing interests of our Association, and it is to this area of concern that I presently direct your attention. How do we determine the content of the pharmacy curriculum, or of any course within the curriculum? How do we know when something should be added or deleted? What motivates our thinking with respect to the inclusion of new subject matter?

Whether or not one consciously sets out to answer these questions, each has certainly formed an opinion which guides him in his actions. Charles A. McMurry in his book *How to Organize a Curriculum* (1) states:

> We have been looking for a working basis, a ground plan for the reconstruction of our elementary curriculum. We need the basal types of activity which objectively represent the large world forces in action. As ongoing projects they are the tangible expressions of the influences which are controlling and organizing our environment. They are surcharged with the best quality of organizing thought. They are not rule of thumb performances but directed, rational activities following progressively the main channels of active enterprise in [our] world.

Was there any necessity for Dr. McMurry to confine his consideration to the "elementary curriculum"? Is it not true that in a professional curriculum, even more so than in the elementary curriculum, the courses are "tangible expressions of the influences which are controlling our environment"? Is it not true that our classroom activities are "directed, rational activities following progressively the main channels of active enterprise in [our] world"? Perhaps it would be helpful for me to restate this proposition in simple terms and say that is our obligation as teachers of pharmacy to analyze the major trends within our area of interest and interpret these through changing curricular content into probable patterns of performance.

If we analyze the dynamics within the profession of pharmacy, two factors seem to be of major importance in determining the future. The first of these and problems incident thereto have been the major topic of discussion at our annual conventions for many years: the rapid advance in drug therapy. Concomitant with this rapid advance and closely integrated with it has been the rapid growth of prefabricated medication. Concern has been shown for the effects which this basic change has had upon our profession and the proper manner for reflecting the change within the curricula of the schools of pharmacy.

The other factor which is not only influencing the future of our profession but that of all other health professions as well is the changing concept held by the public of proper health care and the method of providing that care. Within the past three decades there has been something of a revolution in the concept of the American public toward many aspects of proper health care. This involves not only the responsibility of the health professions to the public, but also the relationship of the public to the professions. The trend has been

*Presented to the AACP, Cincinnati, Ohio, 1959.

created not so much by the leaders within the professions but largely by sociologists, political leaders, and others who at least profess to be interested in the public welfare. Effects of this change in thought are seen most easily in the tremendous appropriations which are made from public funds for the support of hospital construction, medical research, and public health ventures of every type. But they are also reflected in the growth of union-managed clinics, prepaid health insurance plans, and proposed legislation (such as the Forand Bill) which would greatly increase the responsibility of the public toward the health of the people. Among the public utterances which might be cited as evidence of this comparatively new thought (in our country, at least) is the statement of Oscar Ewing in his Report to the President on the Nation's Health (1948) (2):

> If the people will get together—professional workers and public representatives alike—in citizen health councils throughout the country, we will have the satisfaction of proving not only that health is everybody's business but that it is good business, ethical business, essential business, and successful business.

I am concerned with the simple fact that a large percentage of the citizens of the United States apparently hold the conviction expressed by Mr. Ewing that health is everyone's business. I am concerned with the fact that their opinion will inevitably bring profound changes to all of the health professions, including the profession of pharmacy. I am concerned with curricular changes that should be made in order better to prepare students for that service which will be expected of them in a changing environment. I am concerned that we have given so little attention in our curricula and in our public discussions to the question of the pharmacist's role in public health.

Upon mentioning the subject of public health, I must quickly point out that this too is an area undergoing rapid change to the extent that we must realign our thinking in order to understand one another. Public health signifies to many persons a study of epidemiology or public efforts in epidemiological control. I prefer to think of the subject in accordance with the description occurring in Blauch and Webster's *The Pharmaceutical Curriculum:*

> . . . the measures required to the maintenance of health and for the prevention and control of disease. Such a course . . . deals with the application of the pharmacist's knowledge, skill, and facilities to the promotion of the health and welfare of the public in cooperation with public and private health agencies and with particular reference to local, state, federal, and international health activities.

The pharmacist would appear to be strategically located with respect to the implementation of public programs, particularly those of a preventive nature. He is the first point of contact with the public, because people come to him without prior appointment in the normal course of their business or shopping activities. He contacts far more people per day, week, month, or year than any other private practitioner of the health professions. It is well recognized that many persons, whether ill-advised or not, bring their health problems first to the neighborhood pharmacist and are referred by him to a physician, dentist, or other diagnostician.

In his message to the pharmacy graduates of 1959 which appeared in the April 13 issue of *Drug Topics* magazine, Gunnar Gundersen, President of the American Medical Association, said:

> In today's era of expanding health consciousness, the graduate pharmacist is playing an increasingly important part on the national health team . . . More and more, the public service role of the pharmacist is dependent not so much on what he does as upon what he knows.

The Health News Institute, in its publication *Facts about Pharmacy and Pharmaceuticals,* included the following statement:

> The practice of pharmacy has been undergoing a drastic change. The pharmacist as a source of information on new medicines and as a dependable source of distribution has never been more important. The emphasis today is on the knowledge of new products and their control.

Thus, the present and future role of the pharmacist as a professional consultant on new drugs has been well recognized.

Unfortunately, there seems to be a considerable discrepancy between his potential as a co-worker in public health efforts and his performance in these endeavors. During the past two years, I have had the privilege of serving as a member of the Professional Education Committee of the American Cancer Society, Philadelphia Division. As a result of my recommendations to this group, I was invited on several occasions to meet with the national Professional Education Committee. I found to my dismay that the American Cancer Society had not previously made provision for the profession of pharmacy in its professional education programs. The value of the pharmacist has been recognized by the Public Education Committee, particularly with respect to the help which the pharmacist can offer during public campaigns, but his value had remained unrecognized within the professional division. I feel sure that the American Cancer Society was no different in this respect from other organizations which are carrying on public health campaigns of one type or another. I am pleased to report that the American Cancer Society has recognized its omission and urged that each of its local divisions name a pharmacist to the local professional education committee. Dr. H. A. Press, Acting Director of Professional Education, recently informed me that many divisions have taken this step and that a full report will be available at the next national meeting of the Society. If you are not in contact with the local division of the American Cancer Society in your community, may I recommend that you make such contact. If a pharmacist has been named to the committee, he will need your guidance. In the event a pharmacist has not been added, you may be in a position to make a valuable contribution to this work. Please note again that I am not speaking of the campaign committee. Probably many of you have cooperated with the campaign committee in the past, but you may not be familiar with the work of the professional education committee.

The following pharmacy programs have been carried out thus far by the Philadelphia division:

1. A program of education on uterine cancer particularly designed to familiarize the pharmacist with the background for the public education program which was carried out during the spring of 1958.
2. Establishment of a uniform pricing schedule for drugs supplied to indigent cancer patients whose drugs are purchased with the Society's funds.
3. A preliminary survey designed to determine the opportunity which the pharmacist has to disseminate cancer information and to refer patients to physicians.

Through the American Pharmaceutical Association, a proposal has been submitted to the American Cancer Society for an extensive study of the educational needs of the pharmacist in the subject of cancer and the development of a suitable educational program. I regret that this project was not approved for the current year, but I believe the climate is favorable for reactivating the request next year.

It is my intention in the foregoing to indicate the manner in which the pro-

fession of pharmacy may be integrated into a program of public health—in this case, a program of cancer detection. Experiences compel me to make three general observations:

1. Programs such as that of the American Cancer Society are carried on whether or not the pharmacist cooperates. In many instances, such programs include plans for the distribution of drugs, and, more often than not, the plans for such distribution are formed without the benefit of valuable assistance which the pharmacist can give.
2. The role of the pharmacist in such programs is not generally recognized and may need to be formulated.
3. The pharmacist is poorly oriented with respect to his public health role. He knows little about the programs which are in existence, does not recognize his capabilities for cooperation, and too often has meager understanding of the specific problems involved with a particular disease.

The third point indicates my reason for presenting this matter to you today. What provision are we making to train our students for active participation in a public health role? How much do we teach them about public health and preventive medicine? What do they know about institutional medicine? What do they know about public institutions and public health agencies which are in existence?

Taking a specific area which has been mentioned, cancer, permit me to ask a few questions. How much do we teach our students about cancer? Would they be capable of describing the so-called "cardinal symptoms"? When they sell a stomach powder or a pain-relieving proprietary, are they conscious of the fact that they may be helping to conceal a malignancy by providing palliative relief? Do they realize that the death of a patient might result from their failure to insist upon a proper diagnosis? Undoubtedly, every teacher of pharmacy urges his students to avoid counter-prescribing and diagnosis. But is this enough? Is it true that a little knowledge is a dangerous thing—or is it more correct to say that the most intelligent actions are taken by those who are completely informed?

I am wondering if in all of this I am not echoing a suggestion which was reported by the Evaluation Committee of the Columbia University Bobst-Columbia plan (3):

> It should be possible to develop a curriculum which can be much more sharply implemented in store routine than is now the case. It should be possible to introduce subjects which will give the graduates a new perspective and stimulate moves in new directions. It is our belief that there can be brought out a more forward-looking curriculum and if our pharmacy teaching faculties can be made to see new objectives, pharmacy training may undergo transformations which will shape the calling to new and better ends.
> Not only do we believe that it is both practical and feasible to so revamp our courses of instruction as to open new professional vistas and opportunities for pharmacists, we feel that we are obligated to do so.

Perhaps the participants in the brainstorming sessions held in connection with this plan had reached a similar conclusion when they reported (3):

> He [the pharmacist of the future] will be identified with health movements.
> He will play a greater role in dispensing public health information and function as a public health center.

It seems to me that the challenge has been clearly presented in these statements. But I am wondering what we are doing to meet the obligations as presented. I believe that a proper beginning point would be the development of a course in public health and preventive medicine designed to meet the special needs of the pharmacist. Anticipating that this is an area of concern for the Committee on Curriculum, I have taken the liberty of introducing a resolution calling upon the members of that committee to give attention to this problem. In addition

may I suggest that the teachers of pharmacy administration give attention to the rapidly developing area of prepaid insurance programs which include drugs and medicines. Our students' understanding of these programs is necessary if they are to offer effective leadership and guidance.

If our future teaching is successful, we may be able to elevate the public health status of the pharmacist from its present level. It is somewhat disconcerting to find that many books on the subject of public health and preventive medicine make no reference to pharmacy or the pharmacist. In the report to President Truman of the Planning Committee, Medical Care Committee, National Health Assembly of 1948 (2), our profession is completely ignored. Yet the report does include studies of the future needs of the nation in terms of physicians, dentists, nurses, and hospital facilities. Perhaps the most debasing reference occurs in a release from the Public Affairs Institute entitled *Health Service as a Basic Right of All the People* (4). The author appears to be appeasing pharmacy when he says:

> We should frankly recognize that graduate pharmacists are aides in the field of health.

Yet in Chapter 3 entitled *Health Personnel* he makes mention of the Doctor of Medicine, Doctor of Osteopathy, Doctor of Chiropractic, Optometrist, Dentist, Nurse, Chiropodist, and fifteen types of health aides but does not list the pharmacist. In a section titled *The Corner Drug Store and Doc,* he writes (4):

> Doc's corner drugstore is no minor factor in the prevention of disease and the treatment of sickness. "Doc" is the first stop for most ailing persons in a neighborhood. While he is not legally allowed to diagnose and prescribe, both are flexible terms easily stretched in actual practice. And today, so many drugs are well standardized as to content and dosage that the neighborhood druggist can dispense a lot of medicine without transgressing the law and infringing the letter of his license.
>
> By experience, the neighborhood druggist has learned what doctors prescribe, by training and contact with the drug house people, he is up on what is currently being used, *because he is usually directly influenced by the ring of his cash register,** "Doc" has every incentive to serve as the first stopping place for ailing people

This, then, is the public health role of the practicing pharmacist: that he "stretch" his legal authority "without transgressing the law and infringing the letter of his license"!

Although we recognize that these statements constitute a cruel distortion of the motives of a professional group which throughout history has done its share to alleviate pain and suffering and to improve the agents which cure and prevent disease, its publication indicates that it must represent the impression held by some segment of the population. What are we doing as teachers of pharmacy to change this impression? Are we doing enough? Are we taking steps which will permit our graduates of the future to live up to the predictions which we now make of their potential usefulness? Will we see the time when pharmacy is truly integrated with the other health professions in a teamwork such as that envisioned in the following quotation from a public health nurse (5)?

> If we can just do our joining effectively, there is an untold potential for a better world in health and welfare service. The interlocking is horizontal among professions, vertical among levels of jurisdiction, and spherical among countries of the world. And the threads of economics and education, health and welfare span the whole almost comparable to the lines of latitude and longitude that seem to hold the world together.

Members of the Association, herein lies a most urgent challenge. I leave it in your competent and considerate hands!

*Italics supplied by this author.

REFERENCES

(1) McMurry, Charles A., "How to Organize a Curriculum," Macmillan, New York, 1923.

(2) Ewing, Oscar R. *The Nation's Health, Conclusions of the Planning Committee,* Medical Care Section, National Health Assembly, September, 1948.

(3) "The Bobst-Columbia Plan for Pharmaceutical Education. A Report to the Board of Trustees," Columbia University Press, New York, 1957.

(4) Andersen, Dewey, "Health Service is a Basic Right of All the People," Public Affairs Institute, Washington, D.C., 1957.

(5) Oettinger, Katherine Brownell, *Am. J. Pub. Health,* 49, 579 (1959).

As a member of the healing arts group, the pharmacist must of necessity labor constantly with the physician and dentist to effect their common purpose —preservation and cure of disease. This association can meet with full fruition only if the professions enjoy common educational standards in the arts and sciences as well as in professional training.

H. Evert Kendig, Am. J. Pharm. Ed., 11, 41 (1947)

SOME CONSIDERATION OF THE EFFECT OF THE EXTENDED CURRICULUM ON GRADUATE STUDY IN SCHOOLS OF PHARMACY*

LOUIS W. BUSSE

It is a real pleasure for me to discuss with you some of the problems, as I see them, that graduate study in pharmacy will face as we move en masse into adopting the extended curriculum. That the lengthening of the training period would have an impact on graduate study in pharmacy was recognized by many and was a real reason for some members to oppose the adoption of this requirement by our association. I think even those of us who lobbied for the adoption of this new curriculum realized that this extension of time could have an adverse effect on the graduate programs in schools of pharmacy. We were convinced, however, that the profession needed such a strengthening of its educational programs badly enough to warrant the change at the possible expense of the relatively few people involved in graduate training. To be completely fair, I should say in our defense that we did not consider this much of a gamble, for we felt it would be possible to organize our new syllabus in such a way as to permit improved basic science training in the extended curricula and thereby shorten the time of formal graduate study.

I should like to discuss this subject with you from several viewpoints: First, how might it affect our graduate schools of pharmacy in terms of numbers? I'm sure many of you are concerned with the possible discouraging effect this lengthening of the educational span might have on our future students. Secondly, what will the effect of a more complete and substantial professional training have on the desire of the student to seek further training? Third, what will be the demand for the product of this training and how will this affect his desire to continue for further study? Fourth, how might our own curriculum planning encourage or discourage our professional students from entering graduate study?

One of the most frequently heard criticisms of the extended curriculum was founded upon the time factor and the discouraging influence this was going to have on a student's desire to enter into graduate study in pharmacy. Now, certainly one can lengthen the time of a training period to the point of discouraging a number of likely candidates from entering a program. The question is "Have we reached this point with our new requirements?" In my considered opinion we have not.

I base this on our observation of graduate study, and I'm sure others will have had similar experiences. Over the past ten years I do not know of one person who obtained his Ph.D. at Wisconsin in less than four years of graduate study. A high percentage of the students took actually four and one-half years. I'm sure the results at other schools have been similar. A high percentage of the students who came to Wisconsin with a master's degree continued on for another three years before receiving their Ph.D.'s. This makes a total of five years for the higher degree. I do not use these figures to argue a case for the long training period for the Ph.D. degree, but only to illustrate to you the fact that the length of time factor in itself

*Presented to the Section of Teachers of Graduate Instruction, AACP, Cincinnati, Ohio, 1959.

is not necessarily a deterrent to anyone desirous of going on for graduate study. The students who enrolled for graduate study during the period were fully aware of the length of time it would take them to complete their degree work. I see no reason to believe future generations of students will be any different from those of the past.

Now, the primary reason for the long period spent in the graduate school by pharmacy students is their relatively weak training in the basic science areas such as chemistry, physics, and mathematics. As a result, almost two years of graduate study are spent completing the required basic course work. This must be followed by two years of intensive research training to prepare adequately these students for the responsibilities they will be expected to assume in their careers. The extended professional curriculum, if designed properly, should permit a much better, if not necessarily more complete, basic science preparation than the old and thus allow the possibility of reducing the time of formal study for the graduate degree. Thus the extended professional training need not necessarily lengthen the program of graduate study.

Another factor frequently stated as one which would be magnified by the extended curriculum is the cost to the student and the discouraging effect this would have. Now we have indicated that the total length of time for undergraduate and graduate study would be comparable in both the four and five year curricula if the extended curriculum is designed correctly. Therefore, the only real increase in cost will be to the student stopping at the professional degree. In the graduate area, sufficient fellowship monies are available from the National Science Foundation, the National Institutes of Health, the American Foundation for Pharmaceutical Education, and the pharmaceutical industry to finance all the qualified students. I do not believe the factor of increased cost to the student has a basis in fact, and, therefore, it will not be an influence in his decision whether or not to go on to graduate work.

Two of the related but nevertheless intangible factors at the present time are the changes which will occur in the practice of the profession as a result of the extended training period and what effect this more substantial training will have on a student's desire to seek further training.

If the change in practice is such that a high degree of professional satisfaction develops in those practicing the profession, it is understandable that the number of students who now come back to graduate school because of dissatisfaction with the practice of the profession would be lost. This number, however, is a relatively small percentage of our total graduate enrollment. I'm sure these losses could be made up through increased activity on the parts of faculties in recruiting students for graduate study. Certainly the long-range effect of the extended curriculum will be one of increased professional competence in its graduates. They will be responsible for the improvement in professional practice which will occur and which undoubtedly will result in an improved economic reward for our professional people.

There is a trend at present for professional salaries to compare favorably with those of our Ph.D. graduates, and this process should accelerate in the future. It can be anticipated that the evolution which will occur in the profession will result in increased job satisfaction. These two factors

coupled together can be expected to influence strongly the student in his decision whether to enter graduate study or not.

Another factor we must try to evaluate is, "Who will be seeking the skills of the product of the extended curriculum other than the profession itself?" If one analyzes the effect of the more complete training, as represented in the extended curriculum, in relationship to the demand for the finished product, one cannot see where this training will replace the master of science degree, much less the Ph.D. degree. In this regard the extended curriculum does not in any way supplant the training as represented in the M.S. degree and the Ph.D. degree so that these training programs will be as essential as ever. In a similar vein the responsibilities of teaching and research in pharmacy will continue to demand the type of training which is designed to train minds to be inquisitive and to seek the truth, a process which has been carried on in our graduate schools for years. No, the graduates of the extended curriculum will not compete with our higher-degree candidates for the positions in teaching and research. One can foresee, however, an increased demand for the products of the extended curriculum on the part of industry, for the better training will make them more productive workers. Positions as medical service representatives, as skilled personnel in product development areas, in market analysis sections, and in control areas will be filled by these graduates. This may increase the number of students selecting careers in industry over professional careers. I do not believe, however, that this will be at the expense of those students desiring graduate study.

The real impact of the extended curriculum on graduate study, however, will be determined by our own curriculum design. The five year period will lend itself to organization of option curricula such as community pharmacy, hospital pharmacy, industrial pharmacy, and a science option for graduate study. This is desirable; however, there is the danger that in many instances of curriculum planning the decision as to which of these options a student will choose will be forced on him in the first professional year, as it is now. Secondly, there is the danger that the basic science requirement of the professional options generally will be made markedly inferior to those of the graduate study option. If this were to be the case, then the extended curriculum will have a deleterious effect on graduate programs in pharmacy. Now the primary purpose of our schools of pharmacy has always been one of education for the practice of the profession. None will disagree with this. However, one must always be conscious of the fact that the profession has an obligation to itself and to society to contribute to the improvement of its technology for the benefit of the recipients of this technology. In addition, it has a very definite obligation to contribute in an original manner to the knowledge of the basic sciences from which the profession gathers its knowledge and to apply these sciences to its own systems and problems. This means that the profession has as one of its primary duties the responsibility to assure itself that its research population is adequately trained and maintained in quality and quantity.

We are all aware of course that this responsibility actually must rest in the hands of the pharmaceutical educators. While we all know the profession has the obligations just mentioned, the bulk of the practitioners are not always conscious of them and are apt to be concerned primarily with

professional economics. We cannot permit this group to exert too much influence on our curricula design. If we do, we shall only succeed in producing a group of super-technicians capable of practicing in the present instead of a group of educated professional people capable of independent thought and who can adjust to the changes in professional practice over the years. Graduate study and professional education in any field must live symbiotically, and, therefore, the curriculum for the professional side must be designed to permit and to encourage preparation for advanced work. By careful design a course of study can be prepared which will successfully and simultaneously combine professional training and preparation for graduate work.

The two basic premises of such a curriculum are: firstly, it must ensure that the professional curriculum is not inferior in its basic science requirements to those of the other pharmaceutical options, and, secondly, it should give the student the greatest possible time in his university career before he has to decide which branch of pharmacy such as hospital, community, industrial practice, or research he proposes to follow.

The first premise, namely that the professional curriculum not be weaker in its basic science requirements than the other pharmaceutical option, is important for several reasons: one, the complexity of modern drugs and pharmaceutical systems demands a good training in the basic sciences for its comprehension. In a similar vein the use of these systems will become more and more complex as our knowledge about them increases and as our standard for the quality of these products becomes more rigid. This means, of course, that we must be educating our professional people for the practice of the future as well as the present. A curriculum which will prepare our professional students for these eventualities will not be overcrowded with applied professional courses at the expense of basic science courses but will contain a sufficient amount of the latter to ensure comprehension of essential applied material.

Even more significant will be the psychological effect on the student in less-rigorous professional curricula. I feel quite sure when a choice of options is available, that if the professional syllabus is weaker academically than the specialty options, the professional student will feel inferior because he will know he is receiving inferior training. This certainly will not result in a strengthening of the profession and will defeat the whole purpose of the extended training period. One must remember that a profession is no stronger than the capabilities of its practitioners, joined with their pride and ambition. Destroy this at the very beginning, and you are left with nothing. Secondly, adequate basic science training is an essential part of any professional curriculum to prevent our producing a group of super-technicians. This must be avoided or all of the advantages to be achieved through the extended training period will not be realized. Thirdly, graduate study in schools of pharmacy must develop as rapidly as possible, and our professional curricula must be designed to encourage and permit preparation for graduate study simultaneously with professional study. Curriculum planning with graduate study in mind generally leads to a syllabus which gives everybody the opportunity of equivalent training for the first four years and the same opportunities for options of their choice in the fifth year.

To require a student to select an option among two or more curricula

such as community pharmacy, industrial pharmacy, hospital pharmacy, or graduate study prior to completion of the fourth year of any curriculum seems to me to be placing the student under a severe handicap. Especially so if the options other than graduate study consist primarily of applied professional courses which offer poor basic science preparation. This frequently is the case at present, and the student who is well on his way to a degree who suddenly finds himself interested in graduate study is severely handicapped. This is serious enough in the four year program, but in the five year program this would have a disastrous effect in terms of the length of time the student needs to complete his graduate study.

The alternative to this problem is not to have the specialty options available to the student until his fifth year. Up to this time all students should be put through the same vigorous academic program with the opportunity to elect general cultural courses or basic science courses in mathematics and chemistry. In the fifth year, then, the student is in a position to make a decision on the various options or majors available to him and can then specialize in further preparation for graduate study along with the completion of his professional work or elect the other options such as community pharmacy or industrial pharmacy, etc. Under this type of curriculum design, the professional training will be equal in its academic disciplines to the other specialties. The professional student will be made to feel on a par with his classmates who are in specialty training curricula. The student who elects the graduate study major in his fifth year will also have been properly trained and be one who has sympathetic understanding of the attitudes of the related options and, therefore, will not feel superior to the student in the professional majors. I think this is a very important point and should be a major consideration in the planning of any pharmacy curriculum.

It is the responsibility of all schools of pharmacy to make this consideration in planning their curricula, whether or not they offer graduate degree work. In fact the schools who do not have higher work are in the majority at present and are the schools from which the majority of our graduate students in the future must come. It follows then that if these schools do not put suitable curricula into effect which will furnish a satisfactory preparation for graduate study, our source of graduate students coming from schools of pharmacy will greatly diminish. If the students from these schools are so handicapped in preparation for graduate study that the time of professional training plus their graduate training is extended to nine or ten years, one can be sure this will have a disastrous effect on our graduate student population. In this situation we would have no other alternative but to seek graduate students from other areas of the pure and applied sciences. This, of course, means that we would staff our schools of pharmacy with teachers who are not pharmacy oriented in all our areas. I do not believe this would be desirable and, further, could have a serious long-range effect on the profession. I would strongly urge each and every school to reassess the design of their curricula for the extended program in order to determine if they do permit all students the opportunity to combine professional training with preparation for graduate study. If they don't, I would urge all of you to take another look with a mind to rearranging them to permit this symbiosis and so benefit pharmacy in all its ramifications.

SHOULD ALL GRADUATE STUDENTS TAKE A CORE OF GRADUATE COURSES?*

F. P. COSGROVE

The philosophy of requiring all graduate students of the pharmaceutical sciences to take a series of required courses known as the "core curriculum" is not a new idea. I am of the opinion that during the past ten to twenty years it has been reviewed to a considerable extent at several universities offering graduate studies. In addition, the plan has been an informal topic of discussion for even a longer period at the annual meetings of the AACP; however, it has not been fully reviewed at our Section of Teachers of Graduate Instruction. At present we anticipate there are at least two schools of thought on the subject. One group of educators favors the "core idea" while the other group does not favor it.

The purpose of this paper is not to defend or oppose the "core curriculum," but rather to introduce the topic by presenting the opinions on the subject from several educators and to stimulate the intellectual curosity and thinking of this group so more valuable suggestions concerning the basic philosophy of the plan will be offered to the members of this section.

In accepting this assignment, I was fully aware that we have perhaps as many different ideas on the subject as we have pharmaceutical educators. To believe that a report could be presented which would find agreement among every teacher of this intellectual group would certainly be wishful thinking. Furthermore, I am of the opinion that if such a paper were ever developed and presented it would not be a healthy situation for the future of pharmaceutical education. Certainly any sound individual would reject a mandatory program which left little or no opportunity on the part of the faculty of a given university to experiment with new principles and approaches for graduate studies.

While most instructors have indicated that graduate work should be the time for specialization, it is felt the group favoring the "core curriculum" points to the fact that a certain level of attainment, over and above the training obtained from the undergraduate level, is needed by the graduate student if he is going to develop into a capable teacher and researcher in the pharmaceutical sciences. Several leading educators of both groups are of the opinion that courses such as library methodology, instrumentation, statistics, and advanced mathematics are mandatory for specialization and research in any area of graduate study. An instructor at a school which has an optional planned program indicated we need to look only at the present four year plans and some of the proposed five year plans to observe that they lack sufficient disciplines to prepare students for graduate studies. Perhaps this argument would not be entirely valid if all undergraduate programs were to include such areas as library science, calculus, physical chemistry, and a satisfactory course in drug assay which includes the fundamentals of instrumentation. Definitely our undergraduate course should

*Presented to the Section of Teachers of Graduate Instruction, AACP, Cincinnati, Ohio, 1959.

not preclude the student who is interested in graduate work from taking such subjects during his junior or senior year.

Perhaps those favoring the "core" also insist that teachers in our colleges of pharmacy should possess more than a passing knowledge of the various areas which make up the pharmaceutical sciences. At least two of our outstanding teachers of pharmaceutical chemistry have written of the importance of chemistry in teaching pharmacy. One of these distinguished men stated, "The pharmaceutical chemistry instructor is teaching pharmacy—not all of pharmacy but a part of it. If he is to be a successful teacher, maintain the student interest in the subject, and have the student acquire a useful knowledge, he must continually relate pharmaceutical chemistry to the practice of pharmacy." (1) If this is true of the chemistry teacher, is it not also true of the instructors in the other areas? Those favoring the required course idea might rightly ask how can an instructor do this without possessing a modern knowledge of the various areas of pharmaceutical sciences over that which he obtained several years previously during his undergraduate days.

Some educators who may or may not be for the "core plan" see little justification for a special graduate program in our colleges if we repeatedly send the students to the chemistry, biology, botany, bacteriology, or business administration departments for the majority of their work. These people seem to indicate sufficient courses should be taken outside the areas of pharmacy, but considerable emphasis should be placed on problems within our school so that the result will be creative teaching and creative research for the betterment of pharmacy in general.

Those who are opposed to the "core curriculum" sincerely believe that such a program handicaps the instructors and the schools by limiting the opportunities to experiment with different approaches in achieving definite objectives. It is thought the standardized courses have not proved to be the most satisfactory method of acquiring knowledge. One administrator advised that at some of the graduate schools which have been most successful in training outstanding Ph.D.'s both in Europe and Japan, there are very few courses as such and in many cases none at all. Probably a little caution should be considered at this point. I sincerely doubt if it is wise to compare the American system of higher education with those in many other countries. Most foreign universities operate on a system generally known as the "tutor" method of instruction which affords a considerable amount of individual attention to its students. While there may be several deans who would desire such a plan for their graduate areas, it is a question whether any university or college is fully prepared to develop and administer such an expensive program.

They further argue that since most of our graduate students have a degree in pharmacy, they have a sufficient "core" already. A well-established instructor indicated that in time, when the five year program in undergraduate training becomes stabilized, we will discover that students entering graduate school will already have had many of the so-called "core" courses now considered important in graduate work. Such a situation might easily complicate a given program since subjects taught as graduate courses at one school might well be taught as undergraduate subjects at another institution.

If a standardized program is made mandatory, the number of courses which a graduate student may take in his specialty will be limited; thus the student becomes a jack of all trades and a master of none. A Ph.D. graduate under such a plan will find it difficult to compete with graduates in other areas such as chemistry, botany, and bacteriology.

It is seriously doubted by some members that a teacher of pharmacognosy, for example, who has taken one graduate course in pharmacology can or should attempt to advise students on the mode of action of some particular drug. Would it not be better teaching if the instructor referred the student to a person in the pharmacology department?

The majority of persons objecting to the "core idea" see no serious objections to a list of preferred courses in a specialized area; however, such an arrangement of courses should not preclude any student who is extremely interested or gifted in a particular phase of the specialty from taking courses which might benefit his general background. While no program should ever prevent the student from having the option of selecting his courses, it has been suggested that his major advisor should temper and amplify the options so the student may gain the most from his graduate studies.

The replies which I recently received concerning this subject indicate that an over-all "core" program for graduate students would not be received with favor by the majority of our members; however, there appears to be some agreement that in the special areas of pharmaceutical sciences a list of preferred courses could be developed. I personally see nothing wrong with any group of instructors at a particular university developing a "core curriculum" for their school if they so desire, although I think it would be a serious mistake to require such a plan to be mandatory for all our colleges.

REFERENCE

(1) Mattocks, A. M., *Am. J. of Pharm. Ed.*, 19, 305 (1955).

ADDENDUM A

Courses Recommended by Some Educators Actively Interested in Graduate Students

(Not in Sequence of Preference)

Pharmacology: Advanced Physiology, Anatomy, Statistics, Biochemistry, Instrumentation, Isotopes, Math through Calculus, Physical Chemistry, Seminars, and Library Science.

Pharmacy Administration: Library Science, Statistics, Industrial Management and Organization, Marketing, Business Law, Cost Accounting, Retailing, Instrumentation, Formulation and Product Development—Manufacturing Pharmacy, and Seminars.

Pharmaceutical Chemistry: Library Science, Math through Calculus, Statistics, Instrumentation, Physical Chemistry, Advanced Organic Chemistry, Qualitative Organic Chemistry, Biochemistry, Isotopes, Physical Pharmacy or Advanced Course in Pharmacy, Formulation and Product Development—Manufacturing Pharmacy, Pharmacology—Bioassay, Heterocyclic Organic Chemistry, and Seminars.

Pharmacy: Library Science, Math through Calculus, Statistics, Instru-

mentation, Biochemistry, Qualitative Organic Chemistry, Advanced Organic Chemistry, Isotopes, Physical Chemistry, Physical Pharmacy, Formulation and Product Development—Manufacturing Pharmacy, Pharmacology—Bioassay, Advanced Organic Medicinals (Structure vs. Activity), and Seminars.

Pharmacognosy: Library Science, Statistics, Instrumentation, Math through Calculus, Biochemistry, Physical Chemistry, Advanced Organic Chemistry, Qualitative Organic Chemistry, Plant Physiology, Advanced Botany (Taxonomy, Histology, Anatomy, and Morphology), Enzymology, Bionucleonics—Isotopes, and Seminars.

ADDENDUM B

Some Interesting Comments on Courses Which Might Be Considered Graduate-Level Disciplines

1. *History and Literature in Library Science.* While this subject might be developed into a formalized course, the Research Director can supervise the student in the use of the library, and this method may be even more effective than a specific course.
2. *Mathematics.* Mathematics through calculus should be required for all Ph.D. candidates in the pharmaceutical sciences. A student working in the area of physical chemistry or in formulation and product development may require as much as twelve semester credits of calculus, while students working in the field of pharmacognosy or pharmacology may need only a six-semester-credit course.
3. *Statistics.* This is a very important field and perhaps should be taken by all students.
4. *Instrumentation.* This area is becoming increasingly important, and it is felt that a course of three to five semester credits should be recommended.
5. *Biochemistry.* It is believed that most colleges will require biochemistry as an undergraduate course. Advanced courses in enzyme and protein chemistry might be offered to graduate students.
6. *Qualitative Organic Chemistry.* This is a very important course, but it should be developed at the undergraduate level. It should be available also to graduate students.
7. *Advanced Organic Chemistry.* We might handle this area by breaking it up into theoretical organic chemistry and synthetic organic chemistry. A total of nine-twelve semester credits might be offered.
8. *Physical Chemistry.* This is another area which might be best developed at the undergraduate level, but nothing should preclude graduate students from taking the course. At least six to eight semester credits should be offered.
9. *Advanced Organic Pharmaceuticals.* In most cases sufficient material is covered in the undergraduate courses. Perhaps a general seminar devoted to special topics is needed for the graduate level.
10. *Pharmacology—Bioassay.* This is a very important area and probably should be required for all students.
11. *Manufacturing or Product Development.* This area is primarily the application of physical chemistry to pharmaceutical systems and perhaps is an appropriate requirement for all graduate students. Greater emphasis should be given to formulation and product development rather than to manufacturing as such.

GRADUATE TRAINING IN LITERATURE SEARCHING TECHNIQUES*

PATRICK F. BELCASTRO

During the past twenty years, an enormous quantity of scientific literature has accompanied the phenomenal growth of technology and research. For example, *Chemical Abstracts,* which covers the world literature, abstracts about 100,000 articles per year from 7,500 periodicals, 2,000 books, and the patents of twenty-two countries. In the chemical field alone the rate of publication has doubled every eight and one-half years during this century. It has already been announced (1) that the 1947-1956 Decennial Indexes may reach nineteen volumes of 2,500 pages and that the 1957-1966 indexes may reach one hundred volumes.

What is being done to make the literature more easily accessible to the research worker? Several congresses and meetings have discussed this problem. A clearing house for abstracting, indexing, and retrieving information has been proposed. The formation of a government-controlled Institute of Technical Information has also been suggested. Progress is being made to mechanize literature searching by use of the Datatron and various punched-card procedures (2).

The scientist of the future will retrieve information from a giant electronic brain that can store, process, translate, and feed back the desired information in printed form. Until such a dream becomes a reality most of us will continue to search the literature with the same type of skill and intuition that is characteristic of a good detective.

To the research worker in the pharmaceutical sciences, a loss of the "information race" is a problem that can be measured in dollars to the industrial manufacturer and in wasted effort to the graduate student. The pharmaceutical researcher requires information that originates in numerous areas and subdivisions of the biological, chemical, physical, medical, and allied sciences. The volume of information in all of these fields has grown to the point where haphazard methods of literature searching must be discarded. Literature searching requires skill, comprehension of the problem to be solved, and familiarity with various indexing and abstracting services. It is also important to realize the limitations of the various types of information sources. These and many other topics can and should be taught to undergraduate and graduate students.

We are all aware of the importance of the library. As teachers of graduate students, we demand that they consult the library for any one or more of the following reasons:

(a) To become oriented in a new field of study.
(b) To aid in finding and planning research projects.
(c) To avoid duplication of research data.
(d) To correlate new and old information.

The author has observed that most beginning graduate students, especially at the master's level, display little if any knowledge of the most important information sources or techniques essential for a proper search of the pharmaceutical literature. They usually rely on the limited aid received from a trained librarian and in some cases from untrained library personnel. The so-called "thorough

*Presented to the Section of Teachers of Graduate Instruction, AACP, Cincinnati, Ohio, 1959.

literature search" has been too often completed by relying solely on the services of *Chemical Abstracts*. After many months of laboratory experimentation, some graduate students learn to their disappointment that their data appear in the literature. Many research scientists will agree that 50 per cent or more of any research problem can be planned or solved in the library.

When the graduate student begins to write his thesis he often consults his major professor, another graduate student, or refers to a completed thesis to learn the proper organization, format, and local regulations that govern the writing of dissertations. In spite of these good intentions, many types of errors appear in theses that are presented to the major professor. For example, the use of the proper tense in expressing the data and the results may not be known to the student. As a result, many students are later required to change tense of the verb appearing in hundreds of pages of a thesis. Furthermore, valuable time is consumed by the librarian in instructing students individually on the correct method of reporting books, periodicals, bulletins, and other works that appear in the list of references cited in all theses. It is felt that correct procedures can be efficiently discussed in the classroom and thus present the student with conventional and uniform methods that have been suggested by the graduate faculty.

It has been said that the library is a tool of science just as the microscope is indispensable to the microbiologist. Although the majority of pharmaceutical educators would deplore the idea of eliminating laboratory training in teaching the art of pharmacy, very few provide organized instruction to aid the research student in finding scientific information in his field.

The Joint Committee on Pharmacy College Libraries of the American Association of Colleges of Pharmacy has attempted for many years to improve libraries and library instruction at the undergraduate level (3). Blauch and Webster (4) recommend a course in professional communication in which the student should develop "proficiency in acquiring pharmaceutical information from various sources." In some pharmacy schools the librarian may instruct groups of students on the proper use of the library. In most instances students are first exposed to abstracting journals and periodicals when required by teachers to submit term reports and papers. Very few pharmacy schools direct formal instruction of this type at potential graduate students.

The purpose of this paper is to describe a course designed to meet the needs of the graduate students enrolled at the School of Pharmacy at Purdue University. The course was instituted at the suggestion of the Dean and the faculty. The main object of the course is to facilitate searches for information associated with research projects in the pharmaceutical and related sciences.

This course carries two semester-hours of credit and is open to senior and graduate students. All lecture sessions are conducted in such a way as to permit the maximum amount of group discussion. To make this possible and to minimize the amount of note taking by the student, the essential lecture material is mimeographed and distributed to the class at the beginning of each session. Students then have ample opportunity to clarify a procedure not well understood or to initiate discussion of possible difficulties encountered while working on library assignments.

A professional librarian is invited to present a few of the lectures. Both an open- and a closed-book type of examination is held to determine part of the final grade. An outline of the lecture topics is presented as follows:

Graduate Training in Literature Searching Techniques

Course Outline

1. Importance of the library to the scientist.
1. Basic principles of literature searching.
3. Abstracting services, techniques, and limitations.
4. Patents and government documents as sources of information.
5. Correct bibliographic forms.
6. Writing a thesis and the formal technical report.
7. Preparation of an oral technical report.
8. Discussion of the pertinent literature and techniques for literature searches in the following areas:

Pharmacy

Manufacturing	Dispensing	Physical
Administration	Cosmetics	History

Pharmaceutical Chemistry

Searching the literature for organic compounds.
The use of Beilstein's Handbuch der Organischen Chemie and related works.
Finding basic properties of pure chemicals.

Pharmacology

Experimental techniques employed in screening compounds for pharmacological actions.
The toxicological literature.
Clinical studies and mechanisms of drug action.

Pharmacognosy

The pertinent literature concerned with medicinal plant terminology, extraction, constituents, and biochemistry.

To derive the maximum value from the course all students are required to *use* the library for a period of three hours per week during the semester. Mimeographed material is distributed that includes a series of questions and a list of the most important books, periodicals and abstracting services in which the answers could be found. The library assignments cover twenty-one areas, most of which are correlated with the lecture topics previously mentioned. Other topics include Annual Reviews, Foreign Prescriptions, Pharmacopeias of Other Lands, Locating a Thesis, Dictionaries and Handbooks, and New Proprietaries.

Students are permitted to consult only the mimeographed reference lists supplied at the beginning of the course to find the answers to the questions. In trying to find the answers the student examines a cross section of the most important literature in numerous disciplines which make up the pharmaceutical sciences. This procedure is not new and is a modification of the method suggested by Mellon (5). An example of a list of assignment questions and a "work sheet" for the area of physical pharmacy is given as follows:

Assignment Number 1—Physical Pharmacy

1. Differentiate between a Newtonian and non-Newtonian liquid.
2. Report pertinent data on the flow properties of glass beads.
3. Briefly describe two methods employed in measuring vapor pressure.
4. Describe two methods employed for determination of the particle size of emulsion particles. For dry powders?
5. Summarize any original paper reporting a method for evaluating an ointment.
6. Report briefly on the topic of acid-base catalysis with particular reference to the mutarotation of glucose.
7. From the original paper by Hind and Goyan, report on the isotonic values required for eye solutions.
8. List three conclusions derived from original research done on the complexation of medicinals.
9. List four classes of viscometers and name an example that represents each class.
10. Select any topic that is of interest to you in the area of physical pharmacy. Give a brief summary of this topic and state the importance of this topic to the area of pharmaceutical product development.

Work Sheet for Assignment No. 1—Physical Pharmacy

Books

Amsden, J. P., "Physical Chemistry for Premedical Students," 2nd Ed. McGraw-Hill, 1950.
Crockford, H. D. and Knight, S. B., "Fundamentals of Physical Chemistry for Premedical Students." Wiley, 1959.
Glasstone, S., "Elements of Physical Chemistry," Wiley, 1950.
(For other standard texts in physical chemistry, see the card catalog under "Chemistry, Physical and Theoretical.")
Steinbach, O. F. and King, C. V., "Experiments in Physical Chemistry," American Book Co., 1950.
"Advances in Colloid Science," Vol. 1-3, Interscience, 1942-1950.
Fischer, E. K., "Colloidal Dispersions," Wiley, 1950.
Jirgensons, B. and Straumanis, M. E., "A Short Textbook of Colloid Chemistry," Wiley, 1954.
Hartman, R. J., "Colloid Chemistry," Houghton Mifflin, 1939.
Hauser, E. A. and Lynn, J. E., "Experiments in Colloid Chemistry," McGraw-Hill, 1940.
(For other standard works in colloid science see the card catalog.)
Green, H., "Industrial Rheology and Rheological Structures," Wiley, 1959.
Hermans, J. J., Ed., "Flow Properties of Disperse Systems," Interscience, 1953.
Dalla Valle, J. M., "Micromeritics," 2nd. Ed., Pitman, 1948.
Cadle, R. D., "Particle Size Determination," Interscience, 1955.
Clayton, W., "Theory of Emulsions and Their Technical Treatment," 5th. Ed. by C. G. Sumner, McGraw-Hill, 1954.
Sutheim, G. M., "Introduction to Emulsions," Chemical Publishing Company, 1946.

Periodicals

Journal of the American Pharmaceutical Association, Scientific Edition (1912-).
Journal of the American Pharmaceutical Association, Practical Pharmacy Edition (1940-).
Journal of Physical Chemistry (1896-).
Journal of Colloid Science (1946-).
Journal of the Chemical Society (London) (1848-).
Journal of Applied Physics (1931-).
Transactions of the Faraday Society (1905-).
Transactions of the Royal Society of London, Series A., Mathematics and Physical Sciences (1665-).

Students are also required to submit a brief review or evaluation of the periodical, book, or other reference in which the answer to a question is found. This procedure attempts to focus the attention of the student on a type of information source rather than on the mere finding of an answer to a question. All answers to assigned questions are reported on 4 x 6-inch index cards according to a prescribed format. Particular attention is directed to the proper use of punctuation and abbreviations used by *Chemical Abstracts*.

This course is sufficiently flexible so that a student is permitted to search the literature on a topic of his own choosing or substitute a library search related to his research project in lieu of one or more library assignments. In all cases, an attempt is made to lead the student to the literature of the pharmaceutical and related sciences.

It is felt that this type of course develops a certain "feeling" for the literature. Through the library assignments, the beginning graduate student receives valuable practical experience that will permit him to approach his own literature search and the writing of his thesis with a reasonable degree of confidence.

This course not only attempts to make the student aware of the most important literature in his field but also develops in him a sense of thoroughness, orderliness, persistency, and accuracy. These are traits which are not only essential for a good literature search, but they are paramount for any student who proposes to undertake advanced studies in science.

No formal evaluation of this course was made through any type of questionnaire. Favorable comments have been received from some students. The author feels that this is the type of course which attracts the most serious students and is probably avoided by most of the others.

It should be mentioned at this point for those contemplating such a course that its success partially depends upon the availability of a trained librarian with whom the student can consult for questions that may arise during the working of the library assignments.

It is not to be construed from this presentation that the course just described will solve all of the various types of library problems that may confront the graduate student. In effect this course attempts to "lessen the pain" that is associated with literature searching rather than to "eliminate the pain" entirely.

The author recommends that teachers of graduate instruction in the pharmaceutical sciences give serious consideration to inclusion of a course in literature searching techniques in planning their graduate programs.

REFERENCES

(1) Crane, E. J., *Chem. and Eng. News,* 35 (No. 46), 100-102 (1957).

(2) Shera, J. H. et al., "Advances in Documentation and Library Science," Vol. 2, Interscience, New York, 1957.

(3) Osborne, G., *Am. J. Pharm. Ed.,* 21, 229 (1957).

(4) Blauch, L. E. and George L. Webster, "The Pharmaceutical Curriculum," The American Council on Education, Washington, D.C., 1952, p. 160.

(5) Mellon, M. G., "Chemical Publications," McGraw-Hill, New York, 1958.

It doesn't bother me very much if a pharmacist only spends ten or twelve per cent of his time filling prescriptions. That ten or twelve per cent represents ninety-nine per cent of his responsibility.

Edward C. Elliott, Am. J. Pharm. Ed., 10, 452 (1946)

OBJECTIVES AND SCOPE OF THE UNDERGRADUATE COURSE IN MANUFACTURING PHARMACY*

ALBERT M. MATTOCKS

Objectives has become a popular word in recent years, especially when planning a new course for the catalog. We have university objectives, college objectives, and, finally, course objectives. Perhaps we've overworked the word, but we cannot fail to respect the importance of a well-defined set of objectives for a course of instruction. These serve as a basis for the decision as to whether or not a course should be included in the curriculum, they serve as criteria for individual portions of subject matter—whether they should be retained in the course, and, most important, they serve as a stimulus to the teacher as he strives to improve the quality of his instruction.

Thus, we might say that a clear, well-conceived set of objectives is essential to the development and future improvement of a course. It is our task today to state a set of objectives for undergraduate manufacturing pharmacy. Bear in mind that these may be used by colleges of pharmacy to determine the value of such a course in the curricula. If our goals are high the course may be elected, if too high or unrealistic we will fail to achieve them in our teaching; so let us proceed with care and thoughtfulness.

As teachers of manufacturing let us first look at our past. Courses have been taught with the chief aim of selling products. Colleges tie up with hospital and student health service dispensaries, agree to furnish products below market prices, and, in return, not only gain an annual profit, but often receive money for equipment and space allotments. What a plum for a dean! (This is for those of you who are ambitious.) He can expand his laboratories greatly, obtain expensive equipment, add one or two staff members, gain prestige by a close relationship with medicine, and accomplish this with no fund-raising campaign, yet end up with everybody happy. Then the operation is turned over to you to teach a course in which the students, while learning, produce quantities of medicinals, at extremely low labor costs. It is your task not just to teach, but to act as maintenance man for production machinery, as control inspector to insure identity and quality of the product, correctness of labeling and packaging, as shipping clerk to satisfy the always urgent demand, as bookkeeper to see that the company records will stand close inspection by the state auditor at any moment, and as product development man to improve old and develop new formulas to keep up with market trends. This is not asked of you without assistance, of course—you may have one or two graduate assistants, themselves in the learning process, who will devote twelve to fourteen hours per week to the job.

And what are you teaching in this course—not proper control of the manufacturing process, not correct records keeping or proper labeling and shipping procedures—at least not by example.

I propose—and I welcome argument—that if you want to operate a production center you should go right ahead—but keep it entirely apart from

*Presented to the Section of Teachers of Pharmacy, AACP, Cincinnati, Ohio, 1959.

your teaching. Don't even use the same space, the same equipment, or same storage area. We cannot do a good job of both production and teaching with the same student and the same process at the same time.

Another type of course in manufacturing has been presented. It starts out with words something like this: "George, buy a couple of pieces of equipment and teach a course in manufacturing pharmacy." Equipment is assembled, and lectures consist of instructions on the use of the equipment while laboratory consists of using the equipment. The attitude is that so long as the student is making pharmaceuticals on a large scale he is learning manufacturing pharmacy. He is learning techniques, that is true, but is this college-level academic training? Certainly, it is better suited to a trade school and has little value to one not going into industrial production. If our course in manufacturing pharmacy is to be acceptable academically it must not be simply a course in technique.

Having cleansed our souls by confession, let us take a fresh positive approach. What are the important things our student might gain from a course in manufacturing? Remember that he probably is never going to produce tablets or other industrial items at any time in his life after completion of the course.

As a retail pharmacist our student will dispense a large variety of manufactured products over the entire span of his career. He will buy and sell millions of tablets of all shapes and varieties, with enteric coatings, sugar coatings, film coatings, compressed coatings, and no coatings. He will handle tablets with repeat action, delayed action, sustained action, and no action. He will see capsules made of soft gelatin and hard gelatin, filled with oils, powders, and pastes, banded and not banded. We could go on *ad nauseum* listing the tremendous variety of products he will dispense. A part of his function is to exercise judgment in selecting drugs of high quality, properly manufactured and of stable and reliable composition. Further, he must advise physicians as to the most reliable products and as to which type of product might be most useful for a particular diseased condition. This function he cannot perform intelligently if he does not know the composition of the product, how it is made, and the general characteristics of this dosage form. He cannot perform intelligently if he does not recognize the dividing line between merely meeting label claims and producing a therapeutically effective article. A product which contains at the time of manufacture, as the USP often says, not less than 95 and not more than 105 per cent of the labeled amount, may have been made under adverse conditions or with troublesome excipients, so that only a fraction of the major ingredient is present at the time of use or is available to the body for absorption. A vitamin tablet might be considerably cheaper and be labeled to contain the same quantities of vitamins, yet might have lost all of the ascorbic acid or B-12 by the time it is swallowed. A sustained release product may delay release of the medicament just a little too long. It may furnish only a portion of the intended dose, or it may furnish a double dose if not properly made and tested. We all must recognize that we have in our Food and Drug Division an heroic band of proficient, efficient, underpaid men who are too few in number. They cannot, in their present numbers, insure that every product is properly made and effective. It is up to our pharmacist to exercise intelligent judgment in selection of the products

he dispenses and thus aid in protection of the public health of our people. This he cannot do without an understanding of manufacturing and control processes.

As a practitioner of retail pharmacy our student will be involved constantly in problems associated with pharmaceutical manufacturers. He will question the manufacturer's price, the multiplicity of brand names, the sales pitch of the detail man, the legal action taken against substitution, the patenting of therapeutic agents; and the hassles between manufacturers over patent infringements, methods of distribution, and changing of product appearance and labeling. Must our pharmacist bleat his protests in ignorance, or might he have a knowledge of the technicalities involved and protest less frequently but more effectively?

To become an intelligent and significant member of the health sciences our pharmacist must know something of patent and trade mark laws and the way in which they influence drug manufacture. He must know of the food and drug regulations which must be met by industry. He should be aware of the magnitude of research costs, the problems of clinical evaluation, and the requirements for new drug applications. For his own appreciation of prices and supply problems he should be familiar with the complexities of sales organizations, problems of distribution, and advertising.

Finally, our retail pharmacist should recognize the contributions made by the pharmaceutical industry. He should know of the unselfish efforts put forth in the continual improvement of drug standards of the *Pharmacopeia* and *National Formulary*. He should know of the tremendous contributions through research to the improvement of the public health. He should be aware, as well, of the spirit of service which is universally present in industrial pharmacy.

Perhaps we now have a sound basis for the establishment of objectives. I would state them as follows:

To have the student acquire:

1. A knowledge of commercial pharmaceutical products essential to intelligent purchasing and dispensing of these materials. This objective calls for study of manufacturing processes and materials, control processes, and the limitations of control methods.
2. An understanding of relationships between manufacturers and other segments of pharmacy.

   This objective includes relationships between the manufacturer and government, calling for patent and trade mark law, food and drug law, new drug applications, and clinical investigation. It includes relationship with the retailer, covering sales organization, and distribution. It includes relationships to the official compendia and the establishment of standards.
3. An appreciation of the contributions of the drug industry.

If these are to be our objectives, let us shape our course around them, presenting what we believe to be a course of high academic character. We must be on guard, however, that this does not become a survey course, suitable to a high school level, with little depth. Our laboratory exercises require special attention that we do not teach technique to the exclusion of principles. Further, let us keep these objectives before us and use them as a guide to constant improvement.

THE ORGANIZATION OF DIDACTIC MATERIAL AND LABORATORY INSTRUCTION FOR THE UNDERGRADUATE COURSE IN MANUFACTURING PHARMACY. PARENTERAL PRODUCTS*

KENNETH E. AVIS

Thank you for the privilege of presenting some of my thoughts concerning this subject before this Conference of Teachers of Pharmacy. The subject holds considerable interest for me, and I trust that I shall be able to stimulate your thinking concerning the ways of imparting instruction to undergraduate students in the area of the important pharmaceutical specialty, the preparation of parenteral products.

To begin, it should be stated that undergraduate students need to receive instruction in this pharmaceutical specialty, and that as a separate entity rather than as a few inserted thoughts and/or procedures in a dispensing or manufacturing pharmacy course. I'm sure that none of you needs to be persuaded of the importance of parenteral medication in the therapeutic armamentarium of today. The importance of injectables serves in itself to establish the fact that undergraduate students need to receive instruction about this class of products. Undergraduate students do not need to become experts in the manufacture of injectables. However, they do need to be able to appreciate parenteral products and to be able to discuss these products and the problems related to their proper manufacture in an intelligent manner at a professional level. Any of you who have attempted to teach this subject to undergraduate students know that even a senior student has little understanding of many of the terms and procedures applicable to this field; for example, an aseptic procedure. He may indicate that he knows what it is, and he probably does know what the term means, but an understanding of the intricacies and the involvements in the procedure are largely unknown to him unless he has had directed instruction in this particular area. The objective of undergraduate instruction, both didactic and laboratory, should, therefore, be that of giving the student a knowledgeable introduction to the pecularities of this special area of pharmaceutical practice.

Instruction concerning parenteral products should, I believe, be given as a separate entity. This does not necessarily mean that at the undergraduate level it should be given as a completely separate course, but I do believe that it should be given as a distinctly organized series of lectures with laboratory instruction sufficient to make clear to the student the importance and peculiarities of this specialty. For, the proper manufacture of parenteral products requires the application of pharmaceutical knowledge and the accomplishment of rigorous procedures at a level of perfection much greater than that required for any other pharmaceutical product.

DIDACTIC MATERIAL

Preferably, the didactic material should be completed prior to the laboratory sessions. Any normal sequence of laboratory procedures designed to culminate in a completed parenteral product will embrace at least a part of

*Presented to the Section of Teachers of Pharmacy, AACP, Cincinnati, Ohio, 1959.

practically all of the classifications of didactic material that would be given. Unfamiliarity with any one of these classifications, for example, filtration, would retard and reduce the effectiveness of the learning from the laboratory procedure. It would then become simply a matter of following instructions in the manner of automation—certainly not a true learning experience. I'm sure that we all agree that laboratory work procedures should be thoughtful experiences, not simply experiences for the sake of practice. To provide the greatest potential for a thoughtful experience in the laboratory, an understanding of the background for the entire process should be sought in the student through the presentation beforehand of all of the didactic material. To be sure, laboratory experience should make didactic material more vivid than it is possible to do with word description, but the experience should follow the didactic instruction and not vice versa. In the case of parenteral products, the manufacture of one such product so covers the entire range of didactic material that it is not possible to be simply a "lecture or two ahead of the laboratory class."

SEQUENCE FOR DIDACTIC MATERIAL

The best organization and sequence to be followed in the presentation of didactic material concerning the manufacture of parenterals is, I believe, one closely related to the order in which the subjects would be encountered in the preparation of such products. In other words, it is closely related to experience. Teaching this material, first on an elective basis and more recently on a required basis to all of our senior students over the past seven years, has established to my satisfaction the validity of this sequence. The schedule given below illustrates this sequence and is the one followed at present in our lecture series. The selected references for reading are intended to direct the attention of the student to textbook material available, though limited and inadequate, and to encourage supplementary reading from current literature. These references are not intended to be exhaustive of available information. Neither do they contain all of the material presented in the lectures.

PARENTERAL PRODUCTS

Senior Lecture Series

TOPIC	*Selected References for Reading*
General Introduction	"Remington's Practice of Pharmacy XI"—pages 301-320 "Textbook of Pharmaceutical Compounding and Dispensing," 2nd Ed.—pages 212-227 *Pharmacy International* 4, 22 (April) 1955
Vehicles	"Remington"—pages 302-303 "Scoville's Art of Compounding," 8th Ed.—pages 223-4 "USP XV"—page 804
Solutes Added Substances	"Remington"—page 304 "USP"—page 804 *Bull. Am. Soc. Hosp. Pharm.* 12, 534 (Sept.-Oct.) 1955 *Am. J. Pharm.* 125, 365 (Nov.) 1953
Containers	"Remington"—pages 305-306 *Am. J. Pharm.*, 129, 222 (July) 1957 *Pharmaceutical J.*, 175, 282 (Sept.) 1955 "Scoville"—pages 224-226 "USP"—page 805

Closures	"Remington"—page 306 "Scoville"—pages 227-228 *Bull. Parent. Drug Assoc.* 12, 17 (Jan.-Feb.) 1958
Production Surroundings and Personnel Ultraviolet Light Air Filters	"Remington"—pages 308-311
Washing and Drying	"Remington"—pages 307-308 *Am. J. Pharm.* 129, 313 (Sept.) 1957
Preparation of Solutions Control	"Remington"—pages 422-427 *Bull. Parent. Drug Assoc.* 9, 5 (Nov.-Dec.) 1955
Formulation	"Scoville"—pages 235-242 (outdated) *Bull. Parent. Drug Assoc.* 12, 3 (Sept.-Oct.) 1958
Filtration	"Remington"—pages 217-221; 260-263 *Am. J. Pharm.* 129, 410 (Nov.) 1957 "Scoville"—pages 288-292
Filling	"Remington"—pages 311-312 "Scoville"—pages 230-232 "USP"—page 805
Sealing	"Remington"—pages 313-316 "Scoville"—pages 232-233
Sterilization	"Remington"—pages 256-265 "Antiseptics, Disinfectants, Fungicides and Sterilization" by Reddish—pages 746-928 "Principles and Methods of Sterilization" by Perkins—all. "Husa's Pharmaceutical Dispensing," 4th Ed. pages 597-618 "Scoville"—pages 379-398 "American Pharmacy," 4th Ed.—pages 228-232 "USP"—pages 828-832 *Am. J. Pharm.* 129, 425 (Dec.) 1957
Testing Sterility Test	"Remington"—pages 265-267 "USP"—pages 841-846 *Bull. Parent. Drug Assoc.* 14, 24 (May-June) 1956
Clarity Test	"Remington"—page 318
Leaker Test	"Remington"—page 316
Pyrogens and Pyrogen Testing	"Remington"—pages 303-304, 1300 *J. Pharm. and Pharmacol.* 6, 303 (1954) *Pharm. J.* 175, 173 (Sept.) 1955 "Scoville"—pages 218-223
Special Topics Drying by Sublimation	"Remington"—page 125 "Freeze-Drying" by Flosdorf *Drug and Cosmetic Industry* 75, 468 (1954)
Packaging and Labeling Records	"USP"—page 806

Before discussing the subject classifications presented in the lecture sequence, I should like to mention that I have found a very useful tool to be a silent, colored, 16 mm. motion picture film that we made of our laboratory procedures. Shown at the beginning of the lecture series, accompanied by oral comments adapted to the particular audience, it helps to make many of the descriptions of procedures and discussions of principles more mean-

ingful to the student. It is often striking to note the lack of visualization and understanding of many students when procedures and principles in the manufacture of parenteral products are discussed. Previous experiences in dispensing, bacteriology, physics, and other subjects do not always provide for the transfer of knowledge expected. Subsequent laboratory procedures usually stimulate the understanding of principles, but a motion picture film provides the visual point of reference which aids greatly in the presentation of the didactic material in a meaningful manner. Certainly appropriate display material also aids the student in comprehending the function of equipment, steps in procedures, and other matters unfamiliar to him.

CLASSIFICATIONS OF DIDACTIC MATERIAL

I consider the general introduction to be one of the most important portions of the lecture series, if not the most important. At the very beginning I feel that it is necessary to establish the fact that the manufacture of parenteral products requires a "set of the mind," an attitude, which takes fully into consideration the requirements for the manufacture of a pure, safe, and effective product as well as the manner in which it is to be used. When a student is made to realize the significance of the fact that an injection is given past the natural defense barrier which God has provided for our bodies, the intact skin and mucous membranes, he is better able to understand the high-level requirements imposed upon the manufacturing process for injectable preparations. Rigid adherence to established procedural detail, critical observation and detection of minute deviations from proper procedures, scrupulous cleanliness and orderliness, and adequate professional training and discernment are essential characteristics of persons responsible for the manufacture of parenteral products. Establishing in the mind of the student these essential high-level requirements, higher than those for the manufacture of any other pharmaceutical product, is necessary for effective teaching of the succeeding subject matter.

Also included in the general introduction are such matters as definitions, the advantages and disadvantages of parenteral therapy, the routes for parenteral administration, and the classifications of official injections.

Normally the first step in any manufacturing procedure is that of gathering together or preparing the ingredients and supplies. The ingredient used in the largest amount and requiring careful preparation and anticipation of need is the vehicle. Therefore, vehicles are discussed first in our sequence. The numerous vehicles used in parenterals are discussed briefly, but water for injection is considered in detail. Oleaginous vehicles are also given consideration.

Solutes constitute the next subject classification in our sequence. The general requirements of the medicinal solute are discussed. However, particular emphasis is placed upon the special group of compounds classified by the USP as added substances. They are discussed by the categories of bacteriostatic agents, antoxidants, buffers, chemical stabilizers, isotonicity formers, and inert gases. General requirements and specific examples of these categories are given.

Containers and closures must be selected and prepared early in the manufacturing procedure, and so these are discussed at this point in the lecture

series. A brief discussion is presented of both the physical and chemical characteristics of glass containers and rubber closures.

Under the general heading of production, the several steps directly related to the production of parenteral products are presented. First consideration under this heading is given to the selection and attire of personnel. Briefly, the construction and design of sterile production areas are described. Also, the subjects of air filtration and ultraviolet light irradiation are taken up.

The next subject for consideration under the heading of production is that of the washing and drying of containers, closures, and equipment. Time does not permit descriptions of individual examples of equipment, but the general requirements of such equipment are given.

The actual preparation of the parenteral product is discussed next. While the emphasis throughout this lecture series is upon small-volume medicinal products, comments are given from time to time concerning the differences between small-volume and large-volume production. Of course, the identical nature of the principles in most categories is also stated. Time does not permit a detailed consideration of the control of parenteral products, but stress is placed upon the importance of this procedure. In a like manner, the formulation of parenterals and its problems is presented.

The subject of filtration and the selection of filters is given somewhat more consideration than some of the other topics because it has been found that our students have not previously received information concerning the types of filters used in parenteral manufacture and their selection. An attempt is made to give some measure of comparative application of these filters to use with such products.

The production procedures of filling and sealing of ampuls, vials, and bottles are considered next in sequence. Again, little attempt is made to describe individual pieces of apparatus, but general characteristics desirable in such equipment are given.

Since the sealed injectable would most frequently then be terminally sterilized, this subject is presented at this point in the lecture series. However, consideration is given to the over-all subject of sterilization and not just to the terminal sterilization of the product. Thermal sterilization, "cold" sterilization methods, and chemical sterilization, including gaseous sterilization, are discussed.

The last major heading in the lecture series is that of testing the completed product. Emphasis is placed upon those areas of testing peculiarly applicable to parenteral products, including sterility testing, clarity testing, leaker testing, and pyrogen testing. For want of a better location, the nature of pyrogens and their significance is also considered here. The importance and significance of these testing procedures are emphasized in an attempt to cause the student to evaluate the purpose for and the conclusions to be drawn from them.

Time permitting, the special topics of drying by sublimation, packaging, labeling, and record keeping conclude the lecture series.

Throughout the lecture series an attempt is made to correlate the material with didactic and laboratory experiences encountered previously by the student. In addition, an attempt is made to point toward the laboratory experience in the manufacture of parenterals which will follow. Through the organizational sequence and the correlation with experiences previously

encountered and those to follow, it is hoped that the undergraduate student will find this didactic material, though admittedly only an introduction to the subject, both thought provoking and understandable. Presently, nine lecture hours are available in our course for the presentation of this didactic material.

LABORATORY INSTRUCTION

I believe that the laboratory experience for the student in the manufacture of parenteral products should be an actively instructional one. Therefore, the contact between the instructor and the student should be as intimate as possible. I do not believe that it is possible for the laboratory instruction to be effective when the instructor is separated from the students by an office wall or other barrier, or when it is essentially given as the following of mimeographed or printed instructions. It has been my experience that even the better students often do not read the details given in printed form. Therefore, our policy is that of giving a skeleton of mimeographed instructions accompanied by more thorough oral instructions and close instructional supervision during the laboratory procedure.

I have found that it is far more effective to point out to a student a defect in his aseptic procedure, such as the act of swiping his coat sleeve over the mouth of an open ampul or vial, than it would be to hand him written instructions, "Be careful not to inadvertently contaminate your product by such actions as swiping your coat sleeve over the open mouth of an ampul or vial." Procedural defects such as this only have significance to the student when he realizes that he has done that which should not be done. Such instruction can only be accomplished by close observation of the student while he is working in the laboratory.

Procedural instruction is only a part of proper laboratory instruction. The instructor should repeatedly and persistently seek to stimulate the thinking of the student. New procedures often so consume the attention of the student that he simply tends to move mechanically from step to step. While there is much procedural technique and detail for the student to learn in the proper preparation of parenterals, even for the undergraduate student this should not be the sole objective of laboratory instruction. The student should be stimulated to think about the purposes and principles underlying the procedures being carried out. The laboratory instructor should, therefore, question the student as to the purpose of the procedure he is conducting, the significance of an error in procedure on his part, or the physical, chemical, or other principle underlying the procedure he is performing.

Sometimes I permit a student to continue in an erroneous choice in order that the results might impress upon him the importance of prior thought. For example, the student will be strikingly impressed with the necessity for careful consideration in the selection of a bacteriostatic agent for inclusion in a parenteral, if he is permitted to choose a phenolic compound for an injection containing methenamine. The heavy precipitate of a polymer obtained after autoclaving the preparation will impress this fact upon him in a manner such as words could never do. It will also help him to realize that his organic chemistry instruction should be transferred to the parenteral laboratory.

ORGANIZATION OF LABORATORY PROCEDURES

The organization of the work in the laboratory ideally would be such that the student would carry out step by step the entire procedure for the making of a parenteral product. In this way he would best learn the relationship of one step to another and the normal sequence of the procedures. He would also obtain the experience of performing each step himself and would develop proficiency in carrying out the steps during subsequent laboratory sessions. However, the possibility of using this laboratory approach is dependent upon a relatively small number of students in proportion to the laboratory facilities and instructional personnel available. Formerly, when this course was elective for our senior students and the number of students in each section could be held to about ten, the above organizational arrangement was followed. However, now that this course is required for all of our seniors, our facilities are not adequate in size for the individual type of assignment. Consequently, the students in a given section are divided into two units or teams. Each unit or team is then divided into four groups. Assignments are made to these groups so that each student will rotate through the entire fifteen procedural assignments that are designed to complete a parenteral product. During the five laboratory periods that each student is present in the parenteral laboratory, he will perform each assignment once. The following list specifies these assignments. The disadvantages of this arrangement are that a student has the opportunity to perform each assignment only once; they are not necessarily performed in the sequence normal for the manufacture of a parenteral product, and thus a student may lose some sense of the continuity of the steps required; and the work load on succeeding laboratory periods may not be entirely equal. The advantages are that the students learn to work together in units or teams in much the same way that production procedures are organized in the pharmaceutical industry and the students are able to concentrate on learning one phase of the procedure at a time.

PARENTERAL PRODUCTS LABORATORY

Group Assignments

1. Preparation of sterile room.
   Antiseptic wipe down (1:1250 Roccal). Turn on UV lights under hood.
   Check general room order.
2. Preparation of Water for Injection. Determine conductivity.
   Prepare redistilled water and Steril-Aqua water.
   Determine conductivity on redistilled water, Steril-Aqua water, and distilled (college) water. Record each on graphs.
   Sterilize by autoclaving. Label bottles with type water, and date.
   Empty WFI bottles are to be cleaned and resterilized in oven.
3. Washing ampuls, vials, and closures.
   See separate instruction sheet.
4. Preparation of solution and determine pH.
   Prepare solutions using good volumetric technique.
   Determine pH of freshly prepared solution and again after being sterilized in container (next laboratory period).
5. Prepare culture media.
   Prepare, following directions on label, one lot of trypticase soy agar for each laboratory period. Prepare 150 ml., place in tubes, autoclave. Sterilize six plates in oven.
   Prepare, following directions on label, one lot *for each unit* of Fluid Thioglycollate Medium. Prepare twenty tubes of 15 or 40 ml. each, autoclave.
   Sterilize culture media in autoclave, without other materials.

6. Conduct sterility test and plate-air test.
   Test the product made the day assigned to the test. Actually perform the test after sterilization of the product (next laboratory period).
   Plate-air test. Perform the day assigned to the test. Expose plates for twenty minutes in six locations during filling procedure.
7. Filtration of solution.
   Same group that made the solution.
   Select the appropriate porosity filter. Clean after use according to procedure given, bubble pressure test, prepare for resterilization. Mark outside of package with unit number, date, and bubble pressure.
8. Filling and sealing.
   Procedure will be demonstrated.
   Clean filler after use by flushing thoroughly with distilled water and then Water for Injection. Wrap and prepare for sterilization. Mark outside of package with name of contents.
9. Clean up.
   a. Inner laboratory.
      Thoroughly clean, scour if necessary, counters, equipment, and sinks.
      Polish chrome fixtures and sinks.
      Leave laboratory in orderly fashion.
   b. Outer laboratory.
      Clean counters, equipment (including ampul rinser), and sinks.
      Polish sink.
      Leave laboratory in orderly fashion.
10. Sterilization.
    Perform at the end of the laboratory period, using the autoclave and hot air oven. Sterilize product, equipment, supplies, etc. Pack sterilizers in proper manner, selecting appropriate method for the materials to be sterilized.
    Replace all equipment and other materials in cabinets or other proper storage places after sterilization cycle is complete.
11. Clarity test.
    Procedure will be demonstrated.
    Perform on the product made the day assigned to the test. Actually perform the test after sterilization of the product (next laboratory period).
12. Leaker test.
    Performed on ampuls immediately after sealing. Place ampuls tip down in beaker, cover entire ampul with methylene blue solution, place in vacuum chamber and pull vacuum for about twenty minutes.
13. Packaging and production report.
    Groups assigned are responsible for the product made the day assigned to this task.
       Report—begun on day assigned and completed after tests, etc. complete.
       Packaging—after product is tested.
    Group assigned must take charge of product after it is sterilized.
14. Prepare equipment for next laboratory period. Keep locker in order.
    The group assigned to this will make the solution the next laboratory period.
    Select required equipment, in duplicate or with alternate set. Clean and prepare for sterilization. Drain well before placing in oven.
15. Make class solutions.
    When stock is low, make the following: detergent concentrate, Nessler's Reagent, potassium permanganate TS, sodium hydroxide TS, methylene blue 1 per cent (approx.).

Groups from the two units may combine for plate-air test, preparation of sterile room, clean up, sterilization, and making of class solutions.

Individual Assignment

May be performed at any time.
Determine pH of any nine galenicals and one unknown.
One galenical must be tested by all available methods for pH measurement and the results compared. Others must be tested by one method, but each method must be used at least twice.
Turn in report showing name of galenical, pH determined, and method used.

The limitation of time on this program will not permit me to discuss each of the group assignments, but I trust that the organizational arrangement will be clear. The individual pH assignment is designed to fill in the time

wherein a student might complete his assignments early or be required to wait for another student to complete an assignment before he can proceed. Limitations of time and facilities in the laboratory do not permit the assignment of students to the task of conducting the pyrogen test or quality control tests. However, students are assigned to carry out the sterility, clarity, and leaker testing because they are peculiar to parenteral products. Students are also required to keep extensive records, including the signatures of the ones who carry out the particular assignment. By this means it is hoped that students will learn to appreciate the importance of adequate and complete records relative to a parenteral manufacturing procedure.

To reiterate, it is my view that the undergraduate didactic and laboratory instruction should be designed and organized to introduce the student to the peculiar principles and procedures required for the proper manufacture of parenteral products. It should be an introduction, but a thought-provoking and stimulating one, that will better prepare the student for carrying out his professional responsibilities in whatever area of pharmacy he may become engaged.

It does not require any high quality of prophecy to assert that in the next generation, and in the generations to follow, that nation, that class, that group which in this generation succeeds in winning the larger share of trained individuals of superior ability will exercise a controlling influence upon the affairs of our civilization.

Edward C. Elliott, Am. J. Pharm. Ed., 10, 444 (1946)

THE ORGANIZATION OF DIDACTIC MATERIAL AND LABORATORY INSTRUCTION FOR THE UNDERGRADUATE COURSE IN MANUFACTURING PHARMACY: LIQUIDS, SEMI-SOLIDS, AND SOLIDS*

DWIGHT L. DEARDORFF

The following plan consists of two parts. The first section is composed of lectures and demonstrations. It is recommended for consideration by those colleges which do not require manufacturing pharmacy laboratory work of all students. It can be required of all pharmacy students, preferably the fourth year class. It is directed toward the needs of the community pharmacist. It is believed that this individual needs general understanding of industrial pharmacy. The second part consists of lectures and laboratory work. It can be an elective course following the previous material. Here the students would make medicinal products under conditions much like industrial production. The total class time required for this material would be about one semester hour for each part. The entire material could be included in a single course, but if one part is required and the other is elective the two sections would usually be components of two different courses, each containing other topics such as the manufacture of parenterals, formula development, production control, and quality control. For convenience in discussion the terms "required" and "demonstration" will be used to refer to the first part; "elective" and "laboratory" will be used to refer to the second part.

PART I

Equipment is necessarily the major topic and should be covered in lecture in a general way, before the demonstration of a given device. Manufacturers' booklets could be used in class to show the appearance of the items. Reference would be made to only a few of the major specifications such as speed of rotation of coating pans. General discussion would be given concerning the function of each machine, leading into the types of pharmaceutical products which it may be used to produce.

Demonstrations would then be given. The usual demonstration could be presented to about twelve students grouped around one machine, or around a few related machines. It could consist of about twenty minutes of operation of the machines, with explanation of their mode of action and of the operating procedure. The desire here would be to make the most important points quite clear, postponing many specialized items for the elective course to be offered later. The required course normally could include at least five demonstrations of this type. A typical demonstration is that of ointment production, where the ingredients are melted, mixed, milled, remelted, and packaged. This demonstration would usually include the following topics:

A. The fusible ingredients of an ointment in process of preparation could be exhibited being melted together by use of steam heat in a twenty-two quart mixer bowl. Reference could be made to the different bowl

*Presented to the Section of Teachers of Pharmacy, AACP, Cincinnati, Ohio, 1959.

volume capacities, and to the effect of ingredient density on capacity by weight. The batch size here could be fifteen Kg. The advantages of heating with free-flowing steam could be explained, such as even heating and temperature control.

B. Another ointment could be shown being mixed and cooled after fusion. Mention could be made of the two-fold mode of motion of the Reco planetary mixer, its speeds of rotation, and the shape of the bowl. Reference could be made to the schedule for the addition of certain ingredients after the base has congealed to some extent and the reasons for this delay such as reducing separation and minimizing heat effects. Statement could be made of the shortcomings of this step in the procedure in that it does not necessarily make the preparation completely homogeneous at this stage, due to lack of comminution of the unfused solids which have been added.

C. Demonstration could be given of the actual milling of a third ointment. Statement would be made of the purpose (comminution), and of the mill design. Feeding the ointment into the mill would be shown together with the movement of ointment through the mill and consequent shearing action due to roller speed differentials. Explanation would be made of the mode of temperature control of the rollers and the reasons for such control.

Other demonstrations would be carried out in a similar detailed manner, but will be stated here more briefly. Another example is the production of liquids.

In the manufacture of liquids the liquid preparation could be fabricated in a sixty-gallon stainless-steel tank with a Lightnin mixer, and then, if a "solution-type" liquid, filtered with a twelve-inch Ertel plate-and-frame filter press. "Suspension-type" liquid preparations previously mixed in the tank could be milled with a two-inch Manton-Gaulin Colloid Mill.

Prior to the demonstrations of tablet production the required course would probably include lectures on the following topics, depending on what had been covered in previous courses:

A. A general discussion of compressed tablets.
   1. Classification
   2. Types of tableted products
   3. Advantages and disadvantages of tablet medication
   4. Attributes of a good tablet
   5. Methods of tablet production
   6. Tablet ingredients

B. Tablet coating.
   1. Classical
   2. Enteric
   3. Film
   4. Press

Analogous general discussions of the other dosage forms covered, such as ointments and liquids, were not scheduled to be given in this course because of the coverage assumed in other earlier pharmacy courses.

Following the lectures on tablet production the tablet demonstrations would probably include the following topics:

A. Production of tablet granulation. Ingredients could be mixed in a Stokes 21AA or 21B mixer, granulated with a Colton 3WG wet granulator, and dried in a Stokes No. 38B 5-tray electrically heated oven. The dried granules could be sized with a Stokes No. 43A oscillating granulator, and returned to one of the previously mentioned mixers, and mixed with additional required ingredients.

B. Tablet compression. Tablets could be compressed with both a Stokes Model E single-punch press and a Stokes D3 rotary press.

C. Tablet coating Steps in tablet coating using the classical sugar coating procedure could be shown.

The demonstrations would be followed by discussions and recitation periods dealing with the specific demonstration, and also dealing with the related material already covered in lecture and in assigned readings.

PART II

This section consists of the lecture-laboratory course which follows the material described above. Here so far as equipment is concerned, an early step could be to discuss the apparatus in much more detail. These lectures would usually be given in the laboratory beside the device in question, with manufacturers' booklets and a chalk board as aids. They would briefly review previous discussions and in addition would discuss set-up of the machine, maintenance, etc. Following this the laboratory work would consist of the production of medicinal preparations. This work would be done by a team of one or two students closely supervised by a staff member. The students would perform every step of set-up, adjustment, operation, lubrication, tear-down, and cleaning of equipment.

The student's responsibilities would include the preparation of a comprehensive laboratory notebook. The notebook should contain sketches which should show the general appearance of the device and should indicate clearly the design of the working parts that are important to understanding the mode of action. The sketches should be done carefully, but they would not need to be of draftsman quality. Items such as diagrams and pictures taken bodily from other sources, such as manufacturers' booklets, might be helpful supplements to the student's notebook, but would not be accepted in place of adequate drawings prepared by the student. The use, cleaning, and maintenance of the equipment should be covered in a complete and lucid fashion. The manufacturers' booklets often do not cover these topics adequately. Material, taken from such sources, used without adequate elaboration, and without being placed in the student's own words would not be acceptable.

In the elective course, in addition to lectures in the laboratory on the equipment in use, there could be several formal lectures on the different types of equipment. Available equipment could be compared with other equipment used in the industry for such unit operations as size reduction, mixing, drying, separation, granulation, and compression.

In the elective course, the student's responsibility also should include:

A. Careful study of the formulation, procedure, and equipment before starting production. Discussion of key questions with the instructor should be encouraged.

B. Preparation of recommendations for changes. The student should be required to recommend desirable modifications such as changes in formulation, equipment, procedure, quality control, packaging, labeling, and storage. If at first the student should not feel able to suggest improvements, the instructor should then suggest changes and ask the student to comment on their value. Possible use of alternate equipment should be discussed here.

C. Preparation of a cost analysis of the raw materials for certain formulations. The student should also state his recommendation of manufacturer, quality, quantity, and package size to be purchased, based on careful independent thinking.

D. Familiarity with the pertinent literature including texts, journals, equipment booklets, catalogs, and price lists.

The lecture-discussion periods of the elective course would be used in part for discussions connected with the above topics listed as the responsibility of the students. This should give study in depth of a few selected preparations. A given student would study with particular emphasis the five to ten preparations for which he has the principal responsibility in production. However, he would participate in the class discussion of the preparations being made by the others in the class. The class discussion would also include other preparations made by the department. The laboratory should have at least 200 formulas with procedures for the preparation of each product available for study. The suitable preparations can be divided into about twenty types, principally elixirs, emulsions, ointments, solutions, suspensions, syrups, tablets, and suppositories. The lot sizes could be those used in the types of industrial pilot plants which deal with the development of dosage forms. Lot sizes can range upward to fifteen Kg. of ointments, 200 L. of liquids, and 100,000 tablets. The equipment used can be typical of such installations.

SUMMARY

A certain degree of general understanding of the manufacture of pharmaceutical liquids, semi-solids, and solids can be given by a series of lectures and demonstrations.

Such a presentation can be followed effectively by a program of lectures and laboratory work.

There is no greater reward than the inward satisfaction that comes from service to others that is well done.

Lloyd E. Blauch, Am. J. Pharm. Ed., 12, 255 (1948)

AN INDUSTRIAL PHARMACIST'S VIEWPOINT OF WHAT SHOULD BE TAUGHT IN THE UNDERGRADUATE COURSE IN MANUFACTURING PHARMACY*

P. W. WILCOX

At Merck Sharp & Dohme my primary interest is in research. I know very little about sales, economics, management of drugstores, distribution, advertising, hospital pharmacy, etc. One of the boys in my laboratory said, "Wilcox, how can you go to Cincinnati and tell those educators how to run their business? You're not a teacher; you weren't such a good student yourself. You're not even a member of the American College of Apothecaries; they won't let you in because their standards are too high! You can't be a full-time member of the Society of Hospital Pharmacists—you're not one." I said, "Walt, I'm not going to Cincinnati and tell them how to run their business because *I don't know how, and I don't aim to try!*"

But I do think whoever we are, in the profession of pharmacy, we have some problems which are common to *all* of us. So I think you will agree there is a logical basis for our meeting. We have even agreed what the subject should be.

A student or pupil, as the case may be, graduating from a modern college of pharmacy with a five year course should be a pretty well-informed individual in his chosen specialty in the field of pharmacy.

The great Justice Cardozo, in speaking to the graduating lawyers of Syracuse University some years ago, said, "Gentlemen, you know more law right now than you will ever know again." He went on to explain that they would specialize, doubtless, in international law, patent law, or another branch of this profession. There would be refinements in their body of knowledge, but their total knowledge was now at its peak.

Obviously, but few individuals have the capacity to so highly organize their thinking that they can be successful specialists in all phases of any one profession. The lawyer receives training in legal fundamentals and finally attains competency in corporation law, patent law, criminal law, etc. The physician follows a similar course in the basic sciences related to general medicine and then progresses toward his chosen field of specialization, i.e., pediatrics, surgery, obstetrics, etc.

It should not be shocking, therefore, to the embryo pharmacist to learn that if he wishes to reach the top of his profession, he must follow a similar course of preparation.

The major divisions of interest in industrial pharmacy have been described many times. They include research, development, production, sales, distribution, economics, engineering, etc. In any undergraduate course, it seems obvious to me that the student understand thoroughly the boundaries of these elements and should have a general appreciation of the functions of each. Not long ago the average undergraduate asked for an industrial

*Presented to the Section of Teachers of Pharmacy, AACP, Cincinnati, Ohio, 1959.

interview with the thought foremost in his mind that when he graduated he would do anything asked of him to the best of his ability. This in itself is laudable but not enough. When asked what degree of specialization he has accomplished, his reply was often to the effect that he was not interested in teaching, hospital pharmacy, or a government position.

So my first point is that any undergraduate program in industrial pharmacy should define the parameters of industrial positions so that the students have an intimate, although necessarily reserved, association of ideas in this area.

An industrial pharmaceutical research laboratory is often divided into the fundamental and developmental phases. The personnel in each is further classified by specific interests or abilities. The research director must maintain a staff in each of these fields, and below the unit head, train for replacement or advancement so that at all times there may be an intensive application to the specific pharmaceutical problem at hand. This is poorly done when laboratory personnel first have to review the fundamentals before they tackle the immediate problem. Industry looks to the colleges to provide the ultimate in specialization at the graduate level and a broad but fundamental training in undergraduate work.

For many years, I and others in industry have been concerned with the need for reemphasizing in the schools of pharmacy the science of *pharmacy*, defined as *the science and art of preparing, preserving, compounding, and dispensing medicines*. Pharmacy, as just defined, is one of the oldest arts known to man and, as a profession, it has a great heritage. Not only has pharmacy made great contributions to man's battles against disease, it has begotten eminent scientists in related fields, and in some respects, pharmacy may be considered as the mother of related fields of science. The contributions of Scheele, Pelletier, Liebig, and many others attest the influence of pharmacy on the development of chemistry. Other scientific fields, such as pharmacology, botany, and bacteriology, also have been influenced by the men of pharmacy.

Although these allied sciences were nurtured by pharmacy, they have separated and grown enormously in size and scope. Each field of science is now a major segment of the modern university, no longer dominated by the teachers of the schools of pharmacy. Collectively, these fields of science have brought forth countless advancements resulting in our present way of living. In recognizing these scientific developments, we may ask ourselves this question: Are we teaching pharmacy as a profession or are we leaning too heavily on the erroneous assumption, made by some of us, that pharmacy is a confusion of disciplines without boundaries? Of course, it is not. We call on ancillary disciplines when and to the extent needed, just as is done in other professions, but let us not forget to impress on our undergraduates that the core of our existence is a container of medicine—pure, accurately compounded, stable, and active. This is our contribution to well-being and longevity. The chemist who synthesizes a new drug is not capable of developing it into forms the physician can use. The brilliant pharmacologist usually has not the remotest idea of how to go about producing formulations and is often amazed at what the pharmacist can do. This is what I expect. The compounding of drugs on a large scale is the responsibility of the pharmacist. He should be taught to do this as his primary discipline.

The courses in the colleges offered for careers in pharmaceutical production, such as sterile products manufacturing and pharmaceutical control methods, must be well conceived and functional. The production of formulations on a large scale is the foundation of industrial pharmacy and is an integral part of our medical economy. When penicillin was first reported by Florey and Chain to be effective in the control of certain infectious diseases, the need for a practical formulation, producible on a large scale, became evident. The instability of penicillin in aqueous solutions and to dry heat and the appearance of several crystal forms made the production of large quantities of the formulations a very difficult task. This was a new problem in pharmaceutical development, and we who lived through those hectic days had little to draw on from the practices of pharmacy.

Recently we had a striking illustration of the role of the pharmacist in our industry. When the antibiotic "Cathomycin" was presented to the laboratory, it was a credit to the microbiologist as a pure crystalline acid. The pharmacist, being skeptical of the activity, prepared small amounts of an oral suspension, and when tested pharmacologically, it exhibited practically no blood levels. When the pharmacist had reprecipitated "Cathomycin" in a finely divided, amorphous form, it became an orally effective and life-saving drug.

A sterile ophthalmic suspension was studied in the laboratory and clinically for a period of more than a year. There were no difficulties encountered, and the solution remained a water-clear, colorless liquid even when stability tested at temperatures ranging from freezing to 50°C. The first large-scale production lots were made just prior to a vacation shutdown period in the manufacturing laboratories. Each vial was inspected, and the reject rate was practically nil. About one month later, on reinspection, a few vials contained minute filaments, to the naked eye resembling cotton fibers. What does the pharmacist do about it? Here is an investment of $300,000 in material. Advertising copy has been placed with the journals, and they are on the presses. Salesmen have been called in for briefing on the new product. Clinical papers have been written and approved for delivery at the next meeting of the Medical Association. This is purely a pharmaceutical problem of a kind that separates the men from the boys.

If you want to know something about the ability of your staff, call them together and present the problem to them. Some will go home early or take a long coffee break. Pharmacists are embalmed in coffee, and I am afraid sometimes the embalming fluid will wear off at an inopportune time. Some will rush to the library where no information whatsoever is available. Some, however, will think the problem through. In this case, we chose one as a kind of group leader who directed the others in microscopic identification of the fibers, ultraviolet and infrared spectroscopy, an examination of the rubber closure stock, methods of preparation of the rubber and vials, solubility of the filaments in acid and alkali, and a host of other approaches. In this case, emission spectroscopy showed these filaments to be primarily silica. In further study, we found the supplier had changed the approved formula for the rubber composition of the closures.

The point is just this. Pharmacists must tackle and solve very important problems on a large scale. They must do it rapidly and systematically.

They must report their findings accurately and completely both by the verbal route and by the written word.

In dealing with pharmaceutical problems, we should not hesitate to call on other disciplines whenever necessary. The undergraduate student might well be conditioned to do so. To simulate some industrial problem by examples which the student must solve would seem to me to be good exercise. Why not present him with problems in precipitation, floaters, cracking of emulsions, flavoring, tablet capping, development of extraneous odors, or a host of others. Let him call on the other disciplines among students or faculty for aid in their solution. This is done in industrial jobs. It is honest and beneficial. The Reverend Norman Vincent Peale has to deal with people and the vagaries of the mind from a ministerial standpoint. To accomplish this he has set up an organization of ministers, psychologists, and even psychiatrists, to aid him in the solution of these problems. When we wish to apply for a patent in the chemical field, we consult our patent lawyer who has a degree in chemistry. An engineering patent is handled by a lawyer with a previous degree in engineering.

Pharmaceutical production needs some touches of chemical engineering principles, and it is hoped that colleges of pharmacy will draw on the faculty of the engineering schools in designing a course of industrial pharmaceutical engineering. These students should be pharmacists first and engineers second.

The control of the quality of medicines is one of the greatest responsibilities of the pharmaceutical industry. Above all, we must assure safety and efficacy, and under no conditions must the quality and the safety of our drugs be compromised. Our standards of quality must be the best, the most rigid, and the most scientific that man can devise.

The past fifteen years have provided us with better tools of analyses, some chemical but many more instrumental. These instrumental advances have come from the laboratories of physicists and physical chemists and are now part of every modern laboratory devoted to the quality control of drugs. An understanding of potentiometric titrations, ultraviolet, infrared analysis, vapor phase chromatography, and even nuclear magnetic resonance is essential for the pharmacist who seeks a career in control. Congratulations to the colleges who are now taking cognizance of these changes in pharmaceutical control laboratories.

In addition to the above, we need a few pharmacists in industry who have a good working knowledge in the field of colloid chemistry. Perhaps this is graduate work, but we have yet to receive in our laboratories any application for employment from either an undergraduate or graduate student who even professes to have a nodding acquaintance with colloids.

Advanced pharmacology is also a prerequisite for a pharmacist in industry. A pharmacist working on the development or selling of a drug must have an understanding of its pharmacology to work with the pharmacologist or physician studying it in animals or in patients. To develop the most efficient formulation, a research pharmacist must determine the effect of vehicles on the activity of a drug and the effect of particle size on absorption. He must know something about the nature of the drug's toxicity and use this knowledge in his developmental studies. He must gain an understanding

of the absorption of drugs through the intestines, skin, mucous membranes, and the lungs. We know too little about the relation between ointment bases and the effectiveness of drugs in these vehicles. Some of our important compounds have failed in the treatment of a skin disorder because of inadequate knowledge about skin absorption.

The five year plan recognizes clearly the need for general education and provides courses to implant into the student the seeds for the development of an educated man or woman. The pharmacist, irrespective of the location he chooses, must be an educated professional who can take his place on an equal footing with men and women in the related professions. The need to write reports, to express oneself forcibly—orally and in writing—and to have knowledge and interest in the arts and humanities, is greater today because of the increasing complexity of our present civilization. Human values will perish if we become a nation of specialized technicians. Let us recognize, however, that the colleges of pharmacy cannot under the present system produce an educated man as defined by the liberal arts colleges. They can, however, and do, plant the seeds for stimulating the student continually to develop his finer senses and the qualities of the educated man.

I once walked into a so-called "drugstore" with a dean from one of our great midwestern colleges of pharmacy. No other customers were in the store. After several minutes of respectful waiting we rapped on the dirty counter for attention. An old, unshaven man in a filthy shirt and unpressed trousers waddled from the "back room," placed his half-chewed cigar on the edge of the broken glass showcase and said, "Ain't you the dean of the *blank* School of Pharmacy?" "Yes, I am," the dean admitted with some pride. "Well, glad to know you," said the pharmacist. "I graduated from there fifty years ago this week. Yes, sir, I been fifty years in this very same store. Never worked no place else." "What have you done here?" asked the dean. "Oh, I just waited on trade," replied the pharmacist. "Do you belong to any pharmaceutical association?" "No, they don't do no good!" "Did you ever run for office?" "No, ain't never had time; you know I keep the store open from eight in the morning till ten at night." We each bought a pack of cigarettes because they were wrapped and at least clean, on the inside, and gladly left the store. What a worthless philosophy of life that pharmacist had developed. He was proud of his college, but how could his college be proud of him?

To summarize, I feel the colleges are doing a spectacular job right now. The products of their effort are well-trained professional people. In this short paper I have suggested that it would be well in undergraduate work to (a) teach the fundamentals, (b) define the parameters of industrial positions, (c) concentrate on drug compounding on a large scale, (d) interest a few well-chosen students in pharmaceutical engineering and colloid pharmacy, and (e) plant the seeds of a well-rounded humanitarian interest.

. . . the professions operate in a social environment. They have definite relationship to it; they need to understand it.

Lloyd E. Blauch, Am. J. Pharm. Ed., 12, 253 (1948)

A COURSE IN PHYSICAL MEASUREMENTS AND INSTRUMENTATIONS*

L. A. STRAIT, L. D. TUCK, AND F. M. GOYAN

Interest in the science of instrumentation during and immediately after World War II created the atmosphere which led to a serious attempt in many universities to teach fundamental principles of instrumentation in an integrated manner. Following this lead, the authors discussed the possibility of giving an elective course in the School of Pharmacy of the University of California which would provide a few interested students with an opportunity to relate and extend their experience obtained in courses in physics and mathematics to the scientific instruments they used in the laboratory. This objective was later broadened to include, as one of the main purposes of the course, orientation in modern instrumentation combined with a rigorous treatment of selected examples.

The course was first offered in the spring of 1953 under the title "Physical Measurements" and has been presented to a few students each year since that time. Two fifty-minute lectures and one three-hour laboratory meeting per week are devoted to the course for one semester of sixteen weeks. Each time the course is given changes in emphasis appear. However, the basic outline and frame of reference is well established. Students are encouraged to bring up their own ideas and questions during the lecture periods and to devote some of the laboratory time to projects of their own devising.

In presenting a detailed outline of the present course, the authors do not imply that a similar outline should necessarily be followed by other teachers. The essential spirit of the course is illustrated by the development of a few fundamental ideas with maturity and some rigor but with sufficient informality that each student feels free to think for himself and to express his own ideas, however rudimentary they may be in their first inception.

With classes of a few students every year who are motivated by their own spontaneous interest, each presentation of the course has been a rewarding experience for students and teachers alike. Occasionally a brilliant student makes surprisingly able contributions; however, the great majority of the students, who must have had college courses in physics and calculus before being admitted, find the problem sets and lecture materials a sufficient challenge, largely because of their need for review of basic physics and mathematics.

The lectures begin with an introduction to the philosophy of science and the meaning of measurement. A shelf of books dealing with this phase of the course is made easily available. Such titles as *Readings in the the Philosophy of Science* (1), *Philosophy of Science* (2), *Modern Science and its Philosophy* (3), *The Rise of Modern Physics* (4), and *Reflections of a Physicist* (5), are among those selected. Students are invited to read chapters or sections of these books while the lectures develop the operational meaning of physical measurement and touch on various related problems and philosophical implications. The corresponding laboratory work consists of instruction in the analytical balance. In the beginning emphasis is placed on encouraging the student to clean and reassemble an old balance and to recall from his lectures what physical principles are involved.

This laboratory experience provides incentive to learn more about classical

*Presented to the Section of Teachers of Chemistry, AACP, Cincinnati, Ohio, 1959.

mechanics, a subject which is developed in a series of lectures which guides the student up to the point where he is able to handle the approximate solution of the differential equation for the simple pendulum, to understand the exact solution, and to follow a sound treatment of the physical pendulum.

The following books are added to the reference shelf at the start of this series of lectures: *College Physics* (6), *Elements of Physics* (7), and *Physics for Science & Engineering* (8). Copies of the latter textbooks are distributed on a loan basis. However, it has been found that the integrated point of view in this course is not adequately presented by any single conventional textbook.

During this phase of the lecture presentation, the laboratory provides opportunities to study various types of balances. One very old beam balance was deliberately damaged to emphasize the errors caused by slight inaccuracies in construction. A cathetometer is available for measuring the dimensions of the beam of an old analytical balance for the purpose of calculating its period from equations developed during the study of the physical pendulum.

A part of the laboratory work involves the inspection of the working part of a torsion balance and the experimental shifting of its sensitivity by changing its center of gravity. This is easily accomplished by placing a heavy coin on some convenient extension of the beam.

While working with the problem of sensitivity of a torsion balance, one small class discovered, by informal discussion and a few minutes of library work, that there is an anomalous pharmaceutical usage of the terms *sensitivity* and *sensibility* (9) which, according to normal usage, have the same meaning. The term *sensitivity* does not mean *reciprocal sensibility* except in pharmaceutical literature, although the point is so confusing that the authors plan to publish on this subject at a later date in the hope of setting the record straight.

The subjects of hydrostatics and of hydrodynamics are next taken up in the same manner. During this period one or two lectures on statistical analysis and on dimensional analysis are given. The latter subject is always postponed until the group becomes involved with turbulent flow and Reynold's number, but the didactic treatment of statistical analysis always deals with experimental data and is often given during one of the laboratory periods. In the laboratory the students have an electric calculating machine available at all times and are expected to learn to use it. This facility makes the subject fit into the laboratory sequence naturally.

The laboratory work during this phase of the instruction deals with the design and construction of hydrometers, viscometers, and flow meters. Glassblowing facilities are available, and one of the authors provides informal instruction in the art. At least one member of a class usually becomes sufficiently proficient to build a hydrometer from Pyrex glass according to a design agreed upon by all members. Other instruments are also constructed at the glassblowing table. The following titles are added to the references list in connection with this work: *Treatment of Experimental Data* (10), *Dimensional Analysis* (11), and *Industrial Instrumentation* (12).

Approximately the last third of the course is based upon topics in electricity, electromagnetic radiation, and electronics. Although only one formal lecture on transducers and servo-systems is listed below, discussions and demonstrations in the laboratory extending over the last third of the course are pointed to developing an understanding of this broad concept of instrumentation. Students are confronted with a problem and asked to select a suitable transducer and to decide how to make effective use of the resulting electrical signal.

The later lectures are given with the same attention to fundamental concepts so carefully observed earlier. The paperback book, *Electrical Measurements* (13), recently made available by the Minneapolis-Honeywell Co., seems to be a useful addition to the list of physics textbooks.

It is felt that the student should not lose the habit of rigorous analysis but should begin to think in terms of selecting suitable transducers for converting the quantity to be measured into an electrical signal which can be amplified as needed and displayed on a meter, oscilloscope, recorder, or other device such as a servo-controlled "clothes line." The latter was developed extemporaneously and consists of a loop of cord around two pulleys, one of which is operated by a servo-motor. A pointer is fastened at one point on the line and at present is made to indicate temperature sensed by means of a thermistor in a conventional bridge circuit. A "breadboard" X-Y recorder has also been constructed and at present is used as a crude recording spectrophotometer which is introduced after demonstrating a visual spectroscope.

One interesting laboratory project introduced for the first time in 1959 consists of using an old electrical meter movement as a crude electrobalance (14). Students are also invited to work as a group while building a Heathkit "Handitester" which is a simplified multimeter. Other kits of this type may also be provided for the purpose of developing elementary skills in electronic technology. Demonstrations with the oscilloscope and with basic vacuum tube circuits are also introduced into the laboratory part of the course.

Formal problem sets are a required exercise. These sets follow the lecture outline and are usually problems in basic physics. However, the examinations are more informal. The final examination is usually based on a design problem where the student is expected to display some originality as well as to show grasp of basic principles. Field trips to formal displays arranged by instrument manufacturers may well precede such examinations.

It is hoped that this course will not only provide students with a practical grasp of the broader aspects of instrumentation in pharmaceutical science but that it will also serve to develop insight into the deeper meaning of physical measurement and even of physical reality.

SUMMARY

The following list of typical lecture topics serves to summarize this presentation. However, it must be realized that informal instruction given in the laboratory relates all of these topics to basic problems in instrumentation which anticipates by several weeks the formal lecture on transducers and servo-systems.

Lecture Topics

1. Introduction
2. Philosophy of science
3. Evolution of physical concepts
4. Classical mechanics—laws of motion
5. Physics of the analytical balance
6. Forces in equilibrium
7. Derivation of sensitivity
8. Periodic motion
9. The simple pendulum
10. Approximate and exact solutions
11. Motion of a rigid body

12. Compound (physical) pendulum
13. Period of the analytical balance
14. Hydrostatics
15. The physics of buoyancy
16. Stability of a floating object (metacenter)
17. Design and sensitivity of a hydrometer
18. Statistical analysis
19. Hydrodynamics
20. Derivation of Euler's and Bernoulli's equations of stream-line flow
21. Derivation of Poiseuille's equation
22. Viscometry and flow meters
23. Dimensional analysis and turbulent flow—Reynold's number
24. Electrostatic fields and potentials
25. Electrical capacity—time constants
26. Direct current—Ohm's law
27. Kirchoff's laws—multiple-mesh circuits
28. Bridges and Potentiometers
29. Theory of alternating current
30. Electronics
31. Electromagnetic radiation
32. Transducers and servo-systems

REFERENCES

(1) Feigl, H. and M. Brodbeck, "Readings in the Philosophy of Science," Appleton-Century-Crofts, Inc., New York, N.Y., 1953.
(2) Frank, Philipp, "Philosophy of Science," Prentice-Hall, Inc., Englewood Cliffs, N.J., 1957.
(3) Frank, Philipp, "Modern Science and its Philosophy," Harvard University Press, Cambridge, Mass., 1950.
(4) Von Weizsacker, C. F. and J. Juilfs, "The Rise of Modern Physics," George Braziller, Inc., New York, N.Y., 1957.
(5) Bridgman, P. W., "Reflections of a Physicist," Philosophical Library, New York, N.Y., 1957.
(6) Sears, F. W. and M. W. Zemansky, "College Physics," Addison Wesley Press, Inc., Cambridge, Mass., 1947.
(7) Shortley, G. and D. Williams, "Elements of Physics for Students of Science and Engineering," Prentice-Hall, Inc., Englewood Cliffs, N.J., 2nd Ed., 1955.
(8) Weber, R. L., W. M. White, and K. V. Manning, "Physics for Science and Engineering," McGraw-Hill Book Co., Inc., New York, N.Y., 1957.
(9) Goldstein, S. W. and A. M. Mattocks, *J. A. Ph. A., Pract. Ed.*, 12, 293 (1951).
(10) Worthing, A. G. and J. Goffner, "Treatment of Experimental Data," John Wiley and Sons, Inc., New York, N.Y., 1943.
(11) Bridgman, P. W., "Dimensional Analysis," Yale University Press, New Haven, Conn., Revised Ed. 1931.
(12) Eckman, D. P., "Industrial Instrumentation," John Wiley and Sons, Inc., New York, N.Y., 1950.
(13) Stout, M. B., "Electrical Measurements," Rubicon Instruments, Ridge Ave. at 35th St., Philadelphia 32, Pa., 1959.
(14) Cahn, J., "The Cahn Electrobalance," Cahn Instrument Co., Downey, Calif., 1956.

STRUCTURE--CODING FOR SAR PURPOSES*

GEORGE P. HAGER

Pharmaceutical or medicinal chemistry, like any other science, is a system of knowledge resulting from the observation and classification of facts. Some of the most subtle and, yet, the most fruitful theoretical insights in this field involve the correlation that exists between the molecular structure of an agent applied to a biological system and the response of the system to the applied agent. When efforts are made to establish a structure-activity relationship, every well-established fact pertaining to the system, be it positive or negative, assumes considerable importance. When all of the well-established facts are systematized in a way that permits their comprehensive application in a large variety of combinations and permutations, hypothetical structure-activity relationships can be easily probed, more fruitful laboratory endeavors can be undertaken, and productive research can be significantly increased. The ideal system for handling facts pertinent to structure-activity relationships should be one that will minimize pedantry and magnify serendipity in the research and scholarly efforts of the pharmaceutical or medicinal chemist.

Every teacher and researcher in this science is becoming increasingly aware of the rapidly growing supply of well-established facts relating to the response of a biological system to an applied agent, and, by deduction, the relationship between the molecular structure of the applied agent and its biological activity. It has been estimated that knowledge of this type is increasing exponentially, almost doubling every five years at its current rate. Although the index to *Chemical Abstracts* for the decennium ending in 1945 occupied six large volumes, the index for the following decennium will consist of nineteen volumes almost equally large.

Bits of information that might solve a critical structure-activity relationship problem resemble the proverbial needle in the haystack of recorded information. The loss of information that usually results is not only disquieting and inconvenient to the teacher and researcher, but it is also wasteful of the tremendous expenditure of money involved in the original and replicate establishment of many of the facts that are often recorded again and again. A fact of SAR significance that was established in connection with one problem often proves to be of considerable value in a subsequent unrelated problem, provided its record can be approached from a variety of directions, with ease, and, often, unintentionally.

The wasteful loss of information and the equally wasteful duplication of laboratory efforts resulting from the growing mass of recorded data are sometimes attended by overspecialization of teachers and researchers whose visions are shortened and circumscribed through lack of proper communication. Hopefully, this intellectual myopia, where it exists, will not prove to be a hereditary characteristic in the academic offspring. Difficulty in

*In the work that is the subject of this discussion, grateful acknowledgement is due the Smith Kline & French Laboratories and particularly Dr. Glenn E. Ullyot for his foresight and encouragement, Miss Helen Ebert for her tireless devotion, and Dr. Paul N. Craig for his valuable collaboration as progress in this project continues. Presented to the Section of Teachers of Chemistry, AACP, Cincinnati, Ohio, 1959.

adequate communication was exemplified by a microbiologist who was looking for a source of compounds related to one which had proved most interesting in certain tests he was running. After several days of a fruitless search for the compounds he considered to be of interest, he turned to the *Chemical Abstracts* subject index. Here he located reports on a number of compounds related to his prototype and, on checking further, he found that the most interesting of all had been prepared and reported by one of his chemist colleagues. He then walked down the hall to a laboratory very close to his own, and found samples sitting on the shelves.

The information problem with which the pharmaceutical chemist must cope results not primarily from a dearth of facts, but rather from a lack of an adequate systemization of the facts already recorded. The following analysis of the problem and its solution may be an oversimplification, but it does facilitate an appraisal of what may be required in various situations:

Volume of Information	Manipulation	
small	simple	classical methods
large	(relatively) simple	punched cards
small	complex	simple digital computers
large	complex	medium- or large-scale computers

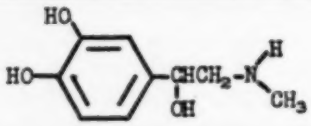
The problem involved in structure-activity correlations arises from the necessity for relatively simple or, sometimes, very complex manipulations of large volumes of information.

Information about molecular structures lends itself particularly well to modern documentation procedures. Unlike the information about biological responses, molecular structures have been fairly well established for most compounds, and complete records of structural data can be prepared. Since structural concepts are descriptive, they are universally understood with a minimum of ambiguity, and their communication is not confused by the homonymy and synonymy that are typical of records of biological data. Most searches or manipulations of information for structure-activity correlation purposes have structural criteria that may be used to reduce the volume of data to a size that can be rather readily handled by classical methods. Finally, the concept of a structure can be factored or broken down into fundamental units.

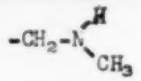
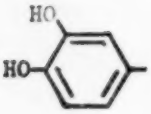
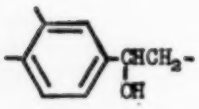
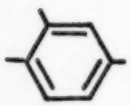
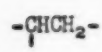
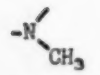
Properly chosen, the units which make up a molecule structure will possess an inherent significance even when divorced from the other units with which they form one structural concept, and they will make a true contribution towards a new structural concept when they are integrated with other structural units. In Table I, four-digit group numbers are employed to represent the units which form the concept of the structure of epinephrine.

In the example given in Table I, epinephrine has been coded by a system that is in many ways similar to the system developed at the Chemical-

TABLE I. A TYPICAL ENCODING OF A MOLECULAR STRUCTURE



$C_9H_{13}NO_3$

Constituent Group	Group No.	Molecular Formula Code[a]
	F5D1	C_9 09 (cols. 61,62)
	F611	N Y (col. 65)
	H752	O_3 3 (col. 66)
	H8G1	
	NY81	
	0191	
	00A1	

[a] The column and punching position on a punched card are designated.

Biological Coordination Center (1). In coding structures for SAR purposes, atomic groupings and other structural features which are significant as far as biological activity is concerned should be selected as units. These pharmacotropic groups often, but not always, correspond to the functional groups, substituents, and stem nuclei that are commonly designated in organic chemistry classifications. In framing a code for these purposes, many structural parameters of biological activity must be considered. However, only those structural features should be included in the coding system which are well defined in the structural concepts of most compounds and which can be handled conveniently both in the coding of structures and in preparing programs for manipulation of the encoded structures.

A careful dissection of a molecular structure during the coding procedure need be done only once. This careful professional effort can then be replicated mechanically in every subsequent search through the compounds that have been coded. The conservation of professional effort made possible by this procedure is obvious. Data, once processed, may be scanned repeatedly and economically by machines. Hence, improbable searches can be made without additional professional effort beyond writing the programs for the searches. (Under these circumstances, one can afford to "take flyers" in manipulation of the data.) Furthermore, every compound that has been coded will be considered in every subsequent search. Consequently, each search is far more comprehensive than would be possible through any classical procedure.

Some combination or permutation of the seven constituent groups (units) that make up the concept of the structure of epinephrine is likely to be responsible, in whole or in part, for the biological activity of epinephrine. If the optimum combination or permutation for epinephrine-like activity could be discerned, compounds with the same structural profile as the epinephrine prototype could be selected for testing; or, if they be new compounds, for synthesis. Even in the very comprehensive indexes to compounds such as *Chemical Abstracts*, epinephrine-like compounds can be found grouped together in very few places. In other words, a classical index provides very few access points to groups of compounds that may be related in a large variety of ways. On the other hand, access to groups of related compounds that have been coded for punched-card operations is so varied that one is able literally to generate an index *a posteriori* at the time of a particular search. For example, epinephrine and all other mono-secondary (dialkyl) amines can be retrieved by use of the F5D1 descriptor. Many other groups of compounds related to epinephrine in various respects may also be brought together: F5D1 + H8G1 = mono-secondary (dialkyl) amino-monosecondary (dialkyl) carbinols. In short, using the seven descriptors 1,2- - -7 at a time, the number of combinations (or searching patterns) for genera of epinephrine-like compounds is:

$$\frac{n!}{r!\,(n-r)!} = 126$$

The permutations of the seven groups in epinephrine would amount to:

$$\frac{n!}{(n-r)!} = > 13{,}000$$

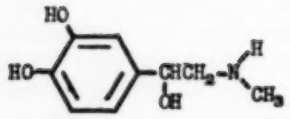
Permutations of molecular structural features corresponds to isomerism. While permutations (or isomerism) should be handled up to a point and can be handled rather comprehensively with medium- or large-scale computers, the economy of the operation must be considered. Moreover, searching programs should never be so definitive that the only information retrieved is that which was envisioned at the beginning of the search, otherwise the serendipity of the system is lost and the results could have been obtained more economically by classical methods.

The 126 combinations indicated on the previous page for epinephrine and its congeners can be made through use of punched cards and relatively

simple machines. In fact, many more combinations can be made since each digit in each four-digit descriptor can be varied in accordance with the three logical conditions: A+B (A and B), A-B (A but not B), and A · B (A or B).

In Table II, the combination and manipulation of descriptors in setting up searching patterns are illustrated.

TABLE II. PROGRAMS OF SEARCHES USING EPINEPHRINE AS PROTOTYPE



Epinephrine
(prototype for the search)

Program I

Dihydric phenol.....H752
Secondary carbinol.....H8G1
Secondary amine.....F5D1
Primary carbinamine.....F611
9 carbon atoms.....09 (cols.61,62)

Program II

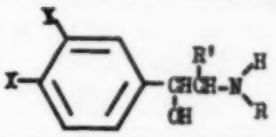
Phenol.....H75
Carbinol.....H8
Secondary amine.....F5D1
9 to 12 carbon atoms.....09 to 12 (cols. 61,62)

Program I is highly definitive of the structure of epinephrine. Almost any compound with this structural profile that is likely to be in a deck of compounds of interest to a pharmaceutical chemist is very likely to have biological properties akin to those of epinephrine. The alternate program II is somewhat less definitive, but should yield compounds that still resemble the prototype in structure. In writing this program, decisions were possible regarding the *location* of a variation, the *nature* of a variation and the *extent* of the variation.

The results of searches through a large number of compounds, including a great many aralkylamines related to epinephrine, are given in Table III.

The applications of the structural information systematized as described in this discussion are manifold and will vary according to the interests of the individual teacher or researcher. Certain of the applications are illustrated or implied in the example that has been given. While there are many other applications for the system, it would be completely justified through its use in answering two broad categories of questions: (1) In view of the structure and desirable activity of a given compound, what other compounds should be tested for the same activity? and (2) In view of the structure of a "new" compound and the activities of structurally related compounds, what biological tests should be applied to the "new" compounds?

TABLE III. COMPOUNDS RETRIEVED USING EPINEPHRINE AS PROTOTYPE



	X	Y	R	R'	Stereoisomerism
	HO-	HO-	CH_3-	H-	dl-epinephrine
I	"	"	"	H-	l-epinephrine
	"	"	"	H-	d-epinephrine
	HO-	HO-	i-C_3H_7-	H-	dl-isoproterenol
	"	"	"	H-	d-isoproterenol
	"	"	"	H-	l-isoproterenol
	"	"	"	CH_3-	
II	H-	"	CH_3-	H-	l-phenylephrine
	HO-	H-	"	H-	l-synephrine
	"	H-	"	H-	d-synephrine
	H-	HO-	C_2H_5-	H-	dl-effortil
	HO-	H-	i-C_3H_7-	H-	
	"	H-	"	H-	

REFERENCE

(1) "A Method of Coding Chemicals for Correlation and Classification," Chemical-Biological Coordination Center, National Research Council, Washington, D.C., 1950.

On the positive side they (professions) are a strong force for progress when managed by persons of imagination and social vision.

Lloyd E. Blauch, Am. J. Pharm. Ed., 12, 251 (1948)

SOME EXPERIENCES WITH THE NATIONAL SCIENCE FOUNDATION SCIENCE FACULTY FELLOWSHIP PROGRAM*

W. LEWIS NOBLES

Despite the fact that I have just concluded one year's study at the University of Michigan under the terms of a National Science Foundation Science Faculty Fellowship Program, I do not presume to speak authoritatively on this topic because there are such highly varying opportunities under this program as to make me realize, full well, my personal inadequacy to do this.

Since there may be those present who are not familiar with this specific program I should like to take advantage of this opportunity to acquaint you with the more salient features of it.

The National Science Foundation, established in 1950 by Public Law 507 passed by the 81st Congress, was charged with many responsibilities relating to research and education in the sciences. This program, the Science Faculty Fellowship program, was established as a means of improving the teaching of science in American colleges and universities. It is based upon the premise that the increased competence of the Fellow as a science teacher gained through his fellowship experience will enable him to contribute more effectively to the training and motivation of science students and thus promote the progress of science and the national welfare.

Approximately 600 awards have been made by the National Science Foundation under this particular program in the three year period since its inception. The fourth group of awards (approximately 300 fellowships) is to be announced in December of this year with a deadline for filing applications of October 5, 1959.

The following material is taken in part from the National Science Foundation brochure announcing Science Faculty Fellowships:

> The primary purpose of these awards is to provide an opportunity for college and university science teachers to enhance their effectiveness as teachers: the fellowships, therefore, are not thought of as designed to provide support for research projects as such. Applicants may request tenures of from three to fifteen months.
>
> Teachers who are unable to consider applying for fellowships tenable during all or part of an academic year may in many cases wish to consider the provision in this program which allows awardees to undertake their fellowship studies in either one, two or three summer periods.
>
> Applications for National Science Foundation Science Faculty Fellowships may be submitted by any citizen of the United States who (a) holds a baccalaureate degree or its equivalent, (b) has demonstrated ability and special aptitude for science teaching and advanced training, (c) will have had three or more academic years' experience in teaching science (as a full-time staff member of instructor of higher rank, teaching undergraduate students mainly) at the collegiate level, and (d) intends to continue teaching.
>
> The National Science Foundation also awards other fellowships at the graduate and postdoctoral levels, the latter at both regular and senior postdoctoral levels. It is recognized that there is not always a clear distinction between the research activities and teaching responsibilities of college faculty members. Hence, many individuals might apply with equal propriety for either a fellowship intended primarily for research workers or one intended for science teachers.

*Presented to the Section of Teachers of Chemistry, AACP, Cincinnati, Ohio, 1959.

Stipends for Science Faculty Fellows are individually computed. The stipend of a salary matching type is computed by taking into account the Fellow's "salaried income" as of the time he applies and any other support expected (for example, other fellowship awards or sabbatical leave pay) during the tenure of his National Science Foundation fellowship. The NSF award is adjusted so that a Fellow's total support—from the Foundation alone or from the Foundation and these other sources—will not exceed $12,000 for a 12 month period. This maximum amount is prorated for tenures of shorter or longer duration (and refers to direct support exclusive of travel and other allowances which may be made available). No Science Faculty fellowship stipend, however, is less than $4,500 per annum *before* adjustment for supplemental income; no award (including allowances) will be less than $2,000 per annum.

An allowance to aid in defraying the costs of travel will generally be paid in addition to the stipend. In the case of travel to a foreign institution of higher education, a travel allowance is made available for only one round trip abroad during the tenure of the fellowship.

Additional allowances not to exceed $600 for each full year of fellowship tenure may be made to Science Faculty Fellows (when requested and justified) to cover costs of unusual fellowship program expenses, special equipment and special travel (such as attendance at scientific meetings). In those cases where charges for tuition and fees are made, the Foundation will also pay the fellowship institution directly for such charges.

A National Science Foundation Fellow is required to devote full time to scientific study and/or scientific research during the tenure of his fellowship. In general, a Science Faculty Fellow may not receive compensation for work performed during his tenure.

Science Faculty fellowships are intended as a means of providing individuals with an opportunity for *improving their competence as college or university teachers* of science, mathematics, or engineering. Applicants must submit an "Activities Program"—an individual plan of study and/or research carefully designed as a mechanism for increasing the competence of the applicant *as a teacher* of science, mathematics, or engineering. This Activities Program must contain a statement showing how the proposed program will enhance the applicant's competence as a science teacher and explicitly justifying the tenure desired and any unusual travel plans. Applicants are free to submit Activities Programs covering a wide range of possibilities: advanced course work (whether or not leading to a degree), research, independent study—all of these, singly or in combination, as well as any other activity which the applicant can demonstrate will enhance his effectiveness as a teacher of science, mathematics or engineering may be included in his Activities Program.

The tenure of a Science Faculty Fellowship is normally either an academic year of nine months or a calendar year of twelve months. Tenures of shorter or longer duration—from approximately three months to fifteen months—are available. It is not considered mandatory that the entire tenure of a fellowship be undertaken in a single, uninterrupted period, but no one period of tenure may, in general, be shorter than three months. The total elapsed time from beginning to termination of the fellowship may not exceed thirty-six months.

In the awards announced under this program in December, 1958, 302 fellowships were awarded from 1,069 applicants. Previously, approximately 300 other awards had been made from more than 1,000 applicants.

My specific "Activities Program" at the University of Michigan was concerned with both advanced course work and independent study. During the course of the Summer Session of 1958 and the 1958-1959 academic year I had the opportunity of six courses in pharmacy, two in pharmaceutical chemistry, three in organic chemistry, and two in the area of higher education at the newly organized center for the study of higher education at the University of Michigan. In addition to the formal course work studied, I had the opportunity of carrying on informal conferences with all members of the pharmacy faculty and many members of the faculty of the chemistry department.

I am happy to state that this period of study has done much to broaden my educational background and open wide many vistas of opportunity which

have escaped me heretofore. The exposure, albeit far too brief, to different teaching situations and ideas of instruction as well as some special research techniques in connection with laboratory instruction accompanying some of the formal courses has already served to create a more imaginative attitude toward educational methods and research problems than I had prior to this program of study. In addition, although it is undoubtedly more difficult to assess their immediate value in terms of this specific program, I would be far amiss not to mention the many rewards resulting from the increased professional contacts which this year has afforded.

Let me urge you, too, not to be too much upset when you hear someone say that pharmacy's relations with physicians are poor. Here, too, the pharmacist making that statement is most likely confessing that he has failed as a pharmacist to impress himself properly upon the medical men in his neighborhood.

Harry S. Harrison, Am. J. Pharm. Ed., 10, 209 (1946)

A PUBLIC RELATIONS PROGRAM FOR PHARMACOGNOSY*

EDWARD P. CLAUS

"Pharmacognosy? What's that?" How many times have you been asked this question? And what has been your answer? Are you immediately on the defensive? Or do you assume a philosophical attitude and begin an involved definition or explanation?

Unfortunately, we pharmacognosists have translated neither the meaning nor the importance of our subject. We have taken a back seat to the representatives of other scientific disciplines who have been more publicity conscious and who have accomplished much more in educating the lay public regarding their science. Pharmacognosy, the oldest branch of pharmacy, at least from the viewpoint of subject matter, has relinquished its prestige to newer sciences which have less to offer in tradition, history, and legend.

This paper is not intended to find fault with those who have been teaching pharmacognosy over the years nor with the manner in which they have taught it. Everyone has the right to teach his subject as he determines. Neither does it suggest that my contemporary workers in the field are not as interested in their subject as they could be. Many of them, at the present time, are engaged in research investigations which reveal hitherto unknown mechanisms of action in the development of biosynthetic plant constituents. Instead, it proposes a plan of action for all teachers in the field of pharmacognosy to consider if the area is to gain much of its lost prestige.

A dean of one of the nation's leading colleges of pharmacy, which boasts of an extensive graduate program, stated recently that the name "pharmacognosy" should be deleted from the pharmaceutical curriculum. In his words, "No one knows what pharmacognosy is anyway, so why not change the name to pharmaceutical biochemistry or, better yet, to pharmacobiochemistry?" There is no doubt that he was exaggerating when he said "No one knows. . . ." Nevertheless we all must agree that "too many" do not know.

When a botanist, zoologist, bacteriologist, physiologist, or pharmacologist is introduced to a fellow scientist in another field, there is no question about the general scope of activities of his specialty. The average lay person is not at a loss to comprehend the duties performed by any of the abovementioned scientists except perhaps those of the pharmacologists; but, even then, he may understand in a vague way that the subject matter deals with drugs and their effects on animals and on animal tissues. Unfortunately, however, he hesitates to venture an opinion about pharmacognosy.

Why does he hesitate? What should we do to counteract his lack of specific information about our field? The following are a few suggestions which we, as pharmacognosists, might consider and adopt.

When we are introduced to an audience, we could lay claim to the title "pharmacognosist" instead of submitting quietly to being called "botanist,"

*Presented to the Section of Teachers of Biological Sciences, AACP, Cincinnati, Ohio, 1959.

"phytochemist," or even "pharmacologist." Often the program chairman of the local garden club, the district PTA or the high school science club would prefer to use a title other than "pharmacognosist" in his introduction. At such times it is a temptation to tell him you are a "botanist" or a "plant chemist," particularly if he hesitates when pronouncing the name "pharmacognosist." It is preferable to type a card for a chairman to use in his presentation. Even syllabilizing the word "pharmacognosy" on the card would undoubtedly be appreciated. Furthermore, if the word becomes mangled and unrecognizable during the chairman's pronunciation of it, you can tactfully use the word correctly in your beginning remarks and perhaps in your conclusion. In this way, you are reemphasizing the term as well as stressing the relationships which it embodies.

A similar situation occurs when you are introduced to a person who is not too well informed about your profession. A stronger impression is made at the time you meet a new acquaintance if you correct a mispronunciation of your professional title rather than have the person retain a misconception of what you do or what field you represent. Naturally, in certain situations discretion is wise; but, would you expect a physician to remain silent if he were introduced as "Mister" John Doe? And if he did, do you feel that he should?

Pharmacognosists have many opportunities to utilize their knowledge and training in furthering interprofessional relationships. Earlier in this paper I have mentioned the term "garden club." A garden club, botanical society, or nature study group welcomes speakers who are qualified to discuss authoritatively medicinal and poisonous plants. If your training has included a sufficient background in botany or in plant physiology, you should not hesitate to address such a gathering of interested people. Often, it will be necessary to acquaint yourself with a member of the group or even to become a member of the organization in order to bring your potentialities to their attention. In these cases, however, the interest you exhibit in joining the group should be genuine; such associations often prove mutually beneficial and provide stimulation and enjoyment among new found friends.

If your educational background embodies more chemical than botanical training, you will find that a high school faculty science club or a local chapter of Sigma Xi or Phi Lambda Upsilon is constantly seeking interesting speakers on practical applications of chemistry to natural phenomena. Again, it could be more meaningful to your listeners and to yourself if you are sincere in your effort to contribute as much as you gain from your associations with your fellow scientists.

It is scarcely necessary to call your attention to the wide variety of topics encompassed by pharmacognosy; indeed, the myriads of products of biological significance touch upon many phases of everyday living. Modern pharmacognosy, however, has become rather specific and has bypassed many plant and animal drugs formerly employed in an empirical manner. Notwithstanding the disdain which some teachers in our field exhibit when plant drugs and medicinal herbs are mentioned (and also such products as coffee, tea, spices, condiments, flavoring agents, and coloring matters), these substances hold much interest for the average person, and, because of this, scientists who can discuss them intelligently are held in high esteem. Similarly, drugs of biological origin in the broad sense include the antibiotics

and the immunizing biologicals as well as certain insecticides and rodenticides. Because these topics are considered in other fields also is no reason for the pharmacognosist to disown them. Any of the above-mentioned groups of substances could provide lecture material for civic- or community-sponsored programs.

Have you explored the possibility of bringing your specialty to the attention of the program chairman of the local Rotary Club, Kiwanis Club, Lions Club, or other service clubs? Purely scientific subjects would not be understood by most of the members of such organizations; however, popular treatment of technical subjects pertaining to plant and animal products used medicinally, to antibiotics, to vaccines, and to poisonous insecticides will stimulate interest in the ramifications of pharmacognosy.

How many of us have the feeling that pharmacognosy must shy away from the word "synthetic" and concentrate wholly on "natural" products? In your lectures, both academic and otherwise, do you emphasize that "synthetic" camphor, for instance, has as its origin the discarded pine tree stumps from which turpentine oil is derived? If you do not, you are overlooking an impressive example to show that some "synthetic" drugs are misnamed. Actually, many are merely modified natural products. In this case, the pine stumps yield pinene which is converted respectively to bornyl chloride, camphene, isobornyl acetate and finally to the so-called "synthetic" camphor. Could this not be referred to as a "modified" natural product?

Again, do you neglect such drugs as homatropine or apomorphine because they are not obtained as such from their natural sources? Inasmuch as only a slight modification of structure is necessary by laboratory methods to produce these from the original alkaloids, we should not ignore these important "artificial" or "synthetic" alkaloids, but rather stress the fact that they are "modified" natural alkaloids.

If such drugs are given the correct emphasis in our lectures to our students, the subject matter of pharmacognosy becomes intimately associated with that in pharmaceutical chemistry, pharmacology, and pharmacy. Perhaps, in this manner, pharmacognosy could represent a thought association in the students' minds. Practical aspects such as these are instrumental in producing a different attitude in the student concerning the importance of pharmacognosy because the course then assumes an integrated status with other courses in the pharmaceutical curriculum.

As many of my colleagues already know, I have stressed, on several occasions in the past, the potential contribution of the pharmacognosist to the field of allergy (1,2). Allergy presents an opportunity for the pharmacognosist to coordinate his experience and training along botanical, microscopical, and phytochemical lines with this specific area of medical science. By field identification of allergenic plants, by microscopical determination of atmospheric pollen grains, mold spores and other biological miscellany, many important causes of hayfever, perennial rhinitis, sinusitis, and asthma can be determined. But since the possibilities of pharmacognosy in this respect have not been pointed out to physicians and to allergists particularly, it is essential that the first contacts be made by the person trained in these phases of pharmacognosy. Offer your services and those of your students, if you have class projects, to the physician specializing in the practice of allergy in your community. After you have gained his confidence in the

accuracy of your work and in the sincerity of your desire to be of assistance, it will not be long until you are asked to speak before the district allergy society. In this way, each time you are introduced as a pharmacognosist, you and your designation will both gain in professional stature.

Parallel situations will develop if you cultivate an acquaintanceship with the agronomist, the county agricultural agent, the local veterinarian, and other persons whose interests are somewhat related to those of the pharmacognosist.

Consider the stimulating effect in public relations when the pharmacognosist offers his services as a consultant to the local poison control center program. No one is better qualified to identify poisonous plants, to know their toxic constituents, and to suggest suitable control measures.

Undoubtedly, one of our greatest failings in pharmacognosy is the lack of adequate research publications in our field. I recall a fervent plea made by Dean Arthur H. Uhl of the University of Wisconsin, School of Pharmacy, to the pharmacognosy teachers assembled at one of the sessions of the 1953 Teachers' Seminar in Pharmacognosy at Salt Lake City. He exclaimed that when conducting research, "It isn't necessary to produce earth-shaking results before you publish your findings." If your problem represents a different approach or if it uncovers a new method, let others know about it. If we would follow Dean Uhl's advice, pharmacognosy would be advanced by each of us.

In a recent article entitled "Research Activity in Colleges of Pharmacy," (3) Dr. Melvin W. Green lists the numbers of publications reported by investigators in the various disciplines of pharmacy during the two year academic period, 1956-1958, as follows:

Pharmacy	120
Pharmaceutical Chemistry	113
Pharmacology	89
Pharmacognosy	30
Pharmacy Administration	16
Pharmaceutical History	15
Pharmaceutical Education	47

If we wish to preserve our professional status, we must contribute more to the scientific and educational literature. Perhaps our inactivity in research investigations may be the result of a lack of funds to purchase necessary equipment or to engage technical assistants. In this situation, we should outline a definite problem and then approach one of the many financial outlets which award research grants for a wide variety of problems. The number of pharmacognosists receiving grants, according to published reports in journals over the past few years, could certainly be increased.

If a lack of productivity in publishing articles is due to a heavy teaching load or possibly to added administrative duties, there may be some justification. But if it is due to an apathetic attitude on the part of the teacher, it is inexcusable. Whatever the reason, we should analyze ourselves critically and resolve to change the "status quo."

Every time an opportunity presents itself we should publicize our subject. It is particularly significant that the Plant Science Seminar has just considered a constitution and bylaws to establish itself as the American Society

of Pharmacognosy. The annual week of activities will still be known as the Plant Science Seminar, but the organization will be reconstituted on a par with other scientific societies and the name "pharmacognosy" should thus be listed on the roster of national scientific associations. Undoubtedly, this recognition will result in greater appreciation of the meaning of the term.

Recently the mail brought a booklet published through the efforts of the Committee on Educational Affairs of the American Society of Pharmacology and Experimental Therapeutics. This booklet is entitled *A Career in Pharmacology* (4) and lists such headings as "What is Pharmacology?" "What a Pharmacologist Does," "What Does Pharmacology Offer?" "It Pays to be a Pharmacologist," and other stimulating topics. Although the information emphasizes medical pharmacology, it refers also to undergraduate training in schools of pharmacy and explains the difference between pharmacology and pharmacy. Perhaps pharmacognosy would benefit from a parallel type of publication.

Another pamphlet which crossed my desk several months ago is that distributed by the Food and Drug Administration describing job opportunities for pharmaceutical chemists, pharmacologists, biochemists, pharmacists, microbiologists and other specialists. It is captioned *The Scientist in the Food and Drug Administration* (5); unfortunately, however, the word "pharmacognosist" is not mentioned any place in the publication. I wrote to Dr. George P. Larrick, Commissioner of Food and Drugs, about the excellent qualifications possessed by the pharmacognosist for many of the positions listed, and suggested that in the revision of the pamphlet the term might well be included. The answer I received stated that pharmacognosists would certainly be considered for any of the positions described for which they were qualified. From this, it would appear that we have not translated fully the scholastic training, the educational background, and the potentialities of graduate pharmacognosists to the Food and Drug Administration officials!

Recently I read in the newspaper about a former colleague of mine, a professor of plant physiology in the Botany Department at the University of Pittsburgh, who was vacationing in Michigan. He was quoted as saying that he was intrigued by and intended to study the physiological and ecological implications of certain seed plants that are able to survive and even thrive on the sand dunes of north central Michigan. This news item made the front pages of the local paper and appeared in several daily papers of Grand Rapids and Detroit. Immediately, I thought of the publicity gained by the teacher, his school, and his specialty of plant physiology.

We pharmacognosists, whether in lecture courses or in practical laboratory investigations, are constantly considering many native plants which constitute a definite part of the flora of our particular locale. Unfortunately, we tend to keep our investigations under cover until we present progress reports at a scientific meeting or until we submit a paper for publication in a scientific journal. No doubt some of us have a feeling that the editor of our local newspaper would decline to publish any of our requests. Or, perhaps we believe that a cub reporter in his rewrite of the story would scramble the details of our observations. To the contrary, I have found most newspaper men and women exceedingly helpful in trying to report the facts correctly and that they sincerely attempt to give their readers all

of the particulars about newsworthy stories and about items of public interest. Furthermore, I believe that they would give space to publicize attendance at national meetings such as this.

In addition, we could submit articles on more general subjects, for instance, the types of noxious plants and methods for their eradication or control, descriptions of the derivation of steroidal hormones from animals or from plants, injurious effects of poisonous insecticides and antidotal treatment, evolutionary changes in antibiotic medication, discussions of new plant and animal drugs, and considerations of the potential value of plants growing in the immediate vicinity. You could surely add many others to this list depending on your particular interest and experience.

Finally, we could encourage promising students to become interested in graduate work and, ultimately, in teaching. It is unfortunate that only a relatively few graduate students are majoring in the field of pharmacognosy. To foster a desire in students for advanced knowledge of medicating agents of plant and animal sources requires enthusiasm on the part of the teacher. Energetic, wide-awake teachers cannot help but stimulate their students correspondingly. There is in every undergraduate an inherent interest in nature and in its natural derivatives which requires nurturing and developing to reach its full potential. Complacency on the part of the teacher tends to quench the fire in those students who seek this knowledge. Imagination and enthusiasm kindle the flame!

The intent of this paper, as stated earlier, is not hypercritical of our failings in the past. But, circumstances being what they are, we must make a concerted effort to educate and re-educate our colleagues in related professional and scientific fields, as well as the public in general, about pharmacognosy and its meaning. We cannot afford to be unconcerned. The world today is accustomed to advertising, by television, by radio, by newspapers, by magazines, by direct mail, and by personal appeal. Pharmacognosy has a bright future, and now is the time to become enthusiastic in our teaching, in our research investigations; and in our dealings with our students, with our professional colleagues, and with the public. We have much to gain and little to lose. Let's adopt a new policy and begin a meaningful public relations program for pharmacognosy!

REFERENCES

(1) Claus, E. P., *J. A. Ph. A., Pract. Ed.*, 14, 28, 1953.

(2) Claus, E. P., *Am. J. Pharm. Ed.*, 23, 259, 1959.

(3) Green, M. W., *J. A. Ph. A., Pract. Ed.*, 20, 28-30, 1959.

(4) "A Career in Pharmacology," American Society of Pharmacology and Experimental Therapeutics, Washington, D.C., 1959.

(5) "The Scientist in the Food and Drug Administration," U.S. Department of Health, Education, and Welfare, Washington, D.C., 1959.

Everywhere men are under the sharp torture of not understanding the why of the wrongness of things.

Edward C. Elliott, Am. J. Pharm. Ed., 10, 444 (1946)

GRADUATE EDUCATION IN PHARMACY ADMINISTRATION*

JOSEPH D. McEVILLA

In recent years committees of this section have made a number of studies regarding various phases of the instructional programs in pharmacy administration. These studies have for the most part concerned themselves with undergraduate rather than graduate instruction.

Acting upon the recommendations of the 1957 report of the Committee on Graduate Education in Pharmacy Administration, Chairman Hall appointed this committee to study the various graduate programs and, in addition to other desired information, determine the degree requirements and course offerings. The committee was not charged with nor has it taken upon itself the responsibility of outlining a definite program in pharmacy administration at the graduate level. The primary objectives of the committee were:

1. To determine the basic required courses for candidates for the master's and/or doctoral degree with a major in the area of pharmacy administration.
2. To determine the academic background of pharmacy faculty members teaching at the graduate level in this area.
3. To determine the scope and nature of minor or supporting courses included in graduate programs in pharmacy administration.
4. To determine the scope and nature of research completed or in progress in the area of pharmacy administration.

In order to obtain the desired information, the committee prepared a questionnaire directed to the teacher of pharmacy administration in each of the member colleges. The response to this questionnaire was most rewarding. A total of sixty-eight questionnaires were returned. A complete tabulation of these returns appears in Table I.

Twelve of the sixty-eight schools and colleges responding to the questionnaire offer graduate instruction in this area. For admission all colleges offering a graduate program require the degree of B.S. in Pharmacy; however, other degrees acceptable are the B.A. with a major in pharmacy, the B.S. with a major in pharmacy, and the Doctor of Pharmacy. The greatest variation in admission requirements is in regard to the number of undergraduate credit hours in pharmacy administration. This requirement ranges from a low of four to a high of twenty-one credit hours. The modal requirement is fifteen credit hours. The admission requirements to schools and colleges offering graduate programs in pharmacy administration are presented in Table II.

One of the stated objectives of this committee was to determine the basic required courses for a master's degree in the area of pharmacy administration. Table III lists the required courses for this degree. In general

*A report of the committee on Graduate Education in Pharmacy Administration, Joseph D. McEvilla, Chairman, R. V. Evanson, Joseph H. Kearn, and Paul C. Olsen. Presented to the Section of Teachers of Pharmacy Administration, AACP, Cincinnati, Ohio, 1959.

there is some degree of uniformity among the courses required by each of the schools and colleges granting the master's degree. The most frequently stated courses are in the areas of marketing and management. Nine of the twelve programs require a minimum of one course in marketing. For the most part these courses are of an advanced or specialized nature and assume the student has had some undergraduate instruction in marketing principles. All programs require a minimum of one course in management or administration. While there is no uniformity of course title, course description indicates there is some continuity in the offerings under such names as Retail Drug Store Management, Pharmacy Management, Retail Management, and Management. Six of the programs require a course in statistics; however, a working knowledge of statistics is required by ten of the twelve schools or colleges offering degree programs. The next most frequently mentioned course is accounting or finance. These courses range from a general accounting course to applied cost accounting and analysis. Law and manufacturing pharmacy are required by some of the programs; however, their frequency is relatively small. The miscellaneous courses which round out the required offerings range from educational psychology to hospital pharmacy administration.

The supporting or minor courses, as might be expected, are much more diversified than the required courses in the major area. The supporting areas vary from accounting and marketing to English, economics, and sales. The most popular area, from the frequency of offering, is economics. Management courses were the next most frequently mentioned, with finance, marketing, accounting, advertising, pharmacy, sales, statistics, law, and English following in that order. A complete list of minor or supporting courses is given in Table IV.

The general requirements for the master's degree, by school, are given in Table V. This table states, for each of the twelve schools and colleges offering graduate programs in this area, the required hours in the major and minor or supporting fields, the foreign language, and thesis requirement as well as whether or not a comprehensive examination and a working knowledge of statistics are required. The required total credit hours range from a low of twenty for one school to a high of forty-eight for another. It is interesting to note that these two schools offer programs through their respective schools of commerce or business administration. It should also be pointed out that the credit-hour requirements for the most part do not include thesis hours. Exceptions to this are the Massachusetts College of Pharmacy which includes a minimum six credit thesis in the required thirty credit hours, and the Brooklyn College of Pharmacy which includes a two-credit thesis orientation course in the required twenty-five credit hours in the major field. Only two schools permit a substitute for the thesis. The Iowa State University permits a terminal master candidate to omit the thesis and substitute eight additional credit hours in course work. The University of California stated a substitute for the thesis was permitted but did not state the conditions under which this was allowed. Only three schools require one foreign language for the master's degree. One of these three permits the candidate to substitute six hours of sequential work, presumably in another tool, for the foreign language.

Six of the schools offering the master's degree also offer the doctorate

in the area of pharmacy administration. Of these six, two are offered through the graduate school of business administration, and one is presently in the development stage. Therefore complete information is available on only four of the six programs. The individual school requirements for the doctorate are given in Table VI. The total required credit hours in both major and supporting fields, exclusive of research and thesis, range from a low of forty-eight to a high of seventy-six, with two schools requiring a minimum of sixty credit hours in course work. In all cases the credit-hour requirement includes the work for the master's degree. All schools require a thesis at the doctoral level. Comprehensive examinations and a working knowledge of statistics are required of all candidates for the doctoral degree at any of the reporting institutions.

The five schools currently offering the doctorate require a minimum of one foreign language. Three schools require two foreign languages without a substitute being permitted; two schools require two languages but permit the substitution of some other research tool such as advanced statistics for one language.

The required courses for the doctoral degree cover a much narrower range than those for the master's degree. The largest offering is in the broad area of pharmacy administration. Other areas involved are economics, pharmacy, finance, and statistics in that order. A complete list of the required course offerings for the doctoral degree is given in Table VII.

The courses utilized by graduate programs in pharmacy administration are given in a variety of schools and departments within the parent institution. These courses range from those offered by the school of business administration to those offered by the pharmacognosy department in the school of pharmacy. The individual course offerings range from the geography of South America to the distribution of drug plants. A complete list of such courses by title and school or department is given in Table VIII.

The committee was particularly interested in the graduate-level courses offered by the department of pharmacy administration. From the information supplied, the various departments offer a total of thirty-three different course titles. While the course content in many instances is similar, no attempt was made to edit, since it was felt that a full list of courses would be of more benefit than a condensed list of composite titles. A complete list of graduate-level courses offered by departments of pharmacy administration is given in Table IX.

A third objective of the committee was to determine the academic background of pharmacy school faculty members teaching graduate courses in pharmacy administration. At the present time there is a total of thirty-one faculty members, full- or part-time, teaching graduate courses in pharmacy administration. Fifteen hold the doctoral degree, ten are full-time members of the graduate faculty of their respective schools, two are full-time members of the school of pharmacy faculty, and three are part-time members of the school of pharmacy faculty. Of the remaining sixteen members, ten hold the M.S. degree, one the LL.M., two the LL.B., and three the B.S. None of these sixteen is a member of his respective graduate faculty. (Many schools and colleges do not distinguish between graduate and undergraduate faculties.) A complete list of the degrees held by faculty members teaching graduate courses in pharmacy administration is given in Table X.

The fourth objective of this committee was to determine the nature and scope of research completed or in progress in this area. There has been a total of forty-one research projects completed or in progress at the present time. These studies range from the study of a model pharmacy to the study of prescription prices under various economic systems. A complete list of research projects offered in support of degrees granted or work currently in progress is given in Table XI.

All of the schools and colleges of pharmacy currently offering graduate instruction in the area of pharmacy administration have on or near their campuses schools of business or commerce which offer graduate courses that could be utilized in a pharmacy administration graduate program. One school does not utilize the services of the school of business or commerce. This school believes that a relationship between the school of business or commerce is not essential to a graduate program in our area. Instead it utilizes the areas of the social sciences and humanities in the college of liberal arts.

Only one of the schools offering graduate work feels that work for the master's degree should be directed toward advanced training in retailing. The other programs permit the student to slant his graduate education toward retailing, economics, industry, advertising, or marketing. Many programs permit the candidate to develop an interest in one or more of these areas.

With the exception of the question concerning the degree offered or favored, the remainder of the questionnaire responses have more significance when the total answers are presented rather than limiting the report to those schools offering advanced degrees.

It is interesting to note that of the schools offering the master's degree, nine, or 75 per cent, favor or offer the master of science degree, one school offers the master of business administration, one school the master of arts, and one school favors the master of pharmacy administration. In the schools or colleges which do not offer graduate work and returned partially completed questionnaires, nine favor the master of science degree and an equal number the master of pharmacy administration degree, one school favors the master of business administration degree, three schools, none of which offers graduate work, favor the doctor of pharmacy administration degree. The remaining schools either favor or offer the doctor of philosophy as the terminal degree.

In response to the question concerning whether every school of pharmacy should conduct a similar program of graduate study in pharmacy administration, the answer is an almost unanimous "No." The main reasons being (1) graduate students having various interests will enter graduate programs and should be able to select a school where their major interest may be met, and (2) not every school is qualified to conduct a graduate program in pharmacy administration.

The reply to the question as to whether or not a school offering a graduate program should lean toward a specialized field in pharmacy administration showed almost equal division. Fifty-nine per cent of those responding felt that there should be no specialization. The reasons advanced are primarily concerned with the freedom of a school to select its own areas and the ability of a nonspecialized program to attract more students. Forty-one per cent of those responding believe that a certain degree of specialization

would be desirable. The reasons stated are that limited manpower in the area will of necessity result in specialization, geographical location in regard to the drug market will bring about specialization, and that each school should have a major area of interest beyond the basic area.

The series of questions concerning the possible future need for personnel with advanced degrees should be of particular interest to those schools currently conducting graduate programs. Nineteen schools or colleges believe their present pharmacy administration staff to be inadequate for future needs. These schools estimate a need for thirty additional personnel in pharmacy administration within the next five years. Many of these estimates are based upon the expansion of present undergraduate programs which would tend to indicate the increased attention and interest expressed in this area.

Of importance to all in the area of pharmacy administration is the intent of schools to offer graduate programs in the future. Twenty-one schools not presently offering a graduate program in this area answered this question. Fourteen schools (67 per cent) stated they intended to offer a graduate program in pharmacy administration at some future date and expressed a potential need for twenty additional personnel.

The final area of interest for this committee was the current enrollment of students in graduate programs in pharmacy administration. From the schools reporting, there is a total of fifty-four degree candidates enrolled in eight programs. Fifty students in seven schools are master's candidates, while four students in three schools are doctoral candidates.

The committee would like to thank the deans and pharmacy administration teachers who cooperated in making this study possible.

TABLE I. RETURNS ON QUESTIONNAIRES TO SEVENTY-EIGHT COLLEGES OF PHARMACY
1958-1959

Group	Frequency	Per Cent
1. Questionnaire acknowledged but not returned because of no graduate program	25	36.8
2. Questionnaires returned from colleges without graduate programs	31	45.6
3. Questionnaires completed and returned from colleges having graduate programs leading to the master's or doctoral degree with a major in pharmacy administration	12	17.6
Total	68	100.00

TABLE II. ADMISSION REQUIREMENTS TO SCHOOLS AND COLLEGES OFFERING GRADUATE PROGRAMS IN PHARMACY ADMINISTRATION

School or College	Degree Required				Required Undergraduate Credit Hours in Pharmacy Administration
	B.S. in Pharm.	*B.A. (Pharm-major)*	*B.S. (Pharm-major)*	*Phar. D.*	
State University of Iowa	*				14
University of California	*				4
University of Colorado	*				15
Massachusetts College of Pharmacy	*				15-18
Purdue University	*	*	*		12
Brooklyn College of Pharmacy	*				14
Wayne State University	*		*		18
University of Arizona	*		*		15
University of Pittsburgh	*	*	*	*	21
University of Wisconsin	*				15
University of Texas	*				Not Stated
University of Southern California	*			*	15

(In all cases satisfactory evidence of ability to do graduate work required.)

TABLE III. REQUIRED COURSES FOR THE MASTER'S DEGREE WITH A MAJOR IN PHARMACY ADMINISTRATION

Area and Course Title	Frequency Mentioned
Marketing	
1. Pharmaceutical Market Analysis and Research	1
2. Drug Marketing Methods	1
3. Marketing Drug Products	1
4. Marketing Organizations and Policies	1
5. Advanced Marketing	1
6. Pharmaceutical Promotion and Selling Methods	1
7. Marketing	3
Accounting	
1. Drug Trade Cost Accounting and Cost Analysis	1
2. Managerial Accounting	1
3. Financial Policies of Business	1
4. Finance	1
5. Accounting	1
Management (Administration)	
1. Retail Drugstore Management	1
2. Pharmacy Management	1
3. Retail Management	1
4. Advanced Management	1
5. Management	1
6. Management Problems	1
7. Retail Problems	1
8. Problems	1
9. Pharmaceutical Sales Management	1
10. Retail Pharmacy Practice	1
11. Production Organization and Management	1
12. Merchandising Procedures	1
Statistics	
1. Quantitative Methods (Economics and Statistics)	1
2. Statistics	5
Law	
1. Regulation of Drug Trade Practices	1
2. Legal Aspects of Business Administration	1
3. Pharmacy Law (nonretail)	1
4. Law	1
Manufacturing	
1. Product Development	1
2. Manufacturing	1
Miscellaneous	
1. Educational Psychology	1
2. History of Economic Thought	1
3. Money and Banking	1
4. Government and Business	1
5. Industrial and Personnel Relations	1
6. Special Problems (Marketing, Retailing, Management)	1
7. Hospital Pharmacy Administration	1
8. Special Topics	1
9. Seminar	1

TABLE IV. SUPPORTING OR MINOR COURSES ACCEPTABLE IN PHARMACY ADMINISTRATION PROGRAMS

Area and Course Title	Frequency Mentioned
Accounting	
1. Financial and Administrative Accounting	1
2. Accounting (cost)	1
3. Accounting	3
Marketing	
1. Industrial Marketing	1
2. Marketing Research	1
3. Advanced Marketing	1
4. Market Research and Analysis	1
5. Marketing	2
Law	
1. Business Law	2
2. Law	1
Statistics	
1. Business Statistics	1
2. Statistical Methods of Sampling	1
3. Elementary Business Statistics	1
4. Statistics	1
English	
1. Business Correspondence	1
2. Business Report Writing	1
3. Specialized Business Report Writing	1
Management	
1. Industrial Management	1
2. Dynamics of Business	1
3. Bank Management	1
4. Problems and Practices of Small Business	1
5. Seminar in Administrative Theory	1
6. Personnel Management	1
7. Industrial Relations	1
8. Problems of Small Business and Service Establishments	1
9. Industrial Organization	1
10. Management	1
Advertising	
1. Advertising Drug Products	1
2. Fundamentals of Advertising	1
3. Retail Advertising	1
4. Advertising	2

(Continued)

TABLE IV. (CONT.)

Area and Course Title	Frequency Mentioned
Finance	
1. Private Finance	1
2. Money and Banking	1
3. Investments	1
4. Short-term Finance	1
5. Long-term Finance	1
6. Finance	1
Sales	
1. Sales Management	1
2. Theory and Practice in Selling	1
3. Selling Drug Products	1
4. Selling	1
Economics	
1. Business Forecasting	1
2. Public Utilities and Transportation	1
3. Real Estate and Urban Land Economics	1
4. Business Cycle Analysis	1
5. Business Concentration	1
6. Government Control of Business	1
7. Current Economic Problems	1
8. Economics for Consumers	1
9. Economics of Buymanship	1
10. International Trade	1
11. Inter-American Economic Relation	1
12. Economics	4
Pharmacy	
1. Industrial Pharmacy	1
2. Dispensing or Hospital Pharmacy	1
3. History of Pharmacy	1
4. Hospital Pharmacy Administration	1
5. Pharmacy	1
Miscellaneous	
1. Psychology	2
2. Education	2
3. General Insurance	1
4. Sociology	1
5. Retail Merchandising	1
6. Risk and Insurance	1

TABLE V. REQUIREMENTS FOR MASTER'S DEGREE WITH A MAJOR IN PHARMACY ADMINISTRATION

School or College	Credit Hours in Major	Credit Hours in Minor	Number of Foreign Languages Required	Substitute for Foreign Language Permitted	Thesis Required	Substitute for Thesis Permitted	Comp. Exam. Required	Working Knowledge of Statistics Required
State University of Iowa	24	6	None	—	Yes	Terminal with 38 hours	No	Yes
*University of California	10	10	None	—	Yes	Yes	Yes	Yes
University of Colorado	16-20	4-8	1	No	Yes	No	Yes	Yes
Massachusetts College of Pharmacy	15-25 (total 30)	5-15	1	No	Yes	No	No	Yes
Purdue University	12	12	1	Yes	Yes	No	No	Yes
Brooklyn College of Pharmacy	25	15	None	—	Yes	No	Yes	Yes
Wayne State University	12	12	None	—	Yes	No	Yes	No
University of Arizona	15	15	None	—	Yes	No	Yes	Yes
University of Pittsburgh	12	12	None	—	Yes	No	Yes	Yes
University of Texas	20	9-12	None	—	Yes	No	No	No
*University of Wisconsin	24	24	None	—	Yes	No	Yes	Yes
*University of Southern California	18	10	None	—	Yes	No	No	Yes

*Program offered through School of Commerce or Business Administration.

TABLE VI. REQUIREMENTS FOR DOCTORAL DEGREE WITH A MAJOR IN PHARMACY ADMINISTRATION

School or College	Credit Hours in Major	Credit Hours in Minor	Nonthesis Research Hours Required	Number of Foreign Languages Required	Substitute for Foreign Language Permitted	Thesis Required	Substitute for Thesis Permitted	Comp. Exam. Required	Working Knowledge of Statistics Required
University of California[0]	NOT STATED			2	No	Yes	No	Yes	Yes
Purdue University	24	24	None	2	Yes (1)	Yes	No	Yes	Yes
University of Pittsburgh	33	27	6	2	Yes (1)	Yes	No	Yes	Yes
University of Wisconsin	40	36	10	2	No	Yes	No	Yes	Yes
University of Texas[0]	Determined by Doctorial Committee			2	No	Yes	No	Yes	Yes
University of Southern California*	42	18	NOT STATED			Yes	No	Yes	Yes

[0] Program offered through Graduate School of Business Administration.
* Program now in the development stage.

TABLE VII. REQUIRED COURSES FOR THE DOCTORAL DEGREE WITH A MAJOR IN PHARMACY ADMINISTRATION

Area and Course Title	Frequency Mentioned
Pharmacy Administration	
1. Advanced Pharmaceutical Retailing	1
2. Pharmacy Marketing Case Studies	1
3. Food, Drug, and Cosmetic Regulation	1
4. Competitive Practices of the Pharmaceutical Industry	1
5. Legislative Control of Pharmacy	1
6. Pharmacy Administration—Seminar	1
7. Problems in Pharmacy Administration	1
8. Special Topics	1
9. Hospital Pharmacy Administration and Operation	1
10. Pharmaceutical Literature	1
Pharmacy	
1. Pharmacy Research	1
2. Pharmacy Seminar	1
3. Advanced Manufacturing Pharmacy	1
Statistics	
1. Advanced Statistical Techniques	1
2. Statistics	1
Economics	
1. History of Economic Thought	1
2. Advanced Economic Theory	1
3. Recent Trends in Economic Theory	1
4. Fundamentals of Economic Theory	1
5. Contemporary Trends and Problems in the Theory of the Firm	1
6. Economic Theory	1
7. Economic Theory Seminar	1
Finance	
1. Financial Control	1
2. Financial Management	1
Miscellaneous	
1. Seminar in Organization and Administration	1
2. Calculus and Analytic Geometry	1

TABLE VIII. COURSES USED IN LIEU OF NONEXISTENT PHARMACY ADMINISTRATION COURSES

School of Business Administration	
	Geography of South America
	Economic Geography of the United States and Canada
	Geography of Western Europe
	Industrial Geography
	Conservation of Natural Resources
	Foreign Trade Techniques
	Business Law
	Cost Accounting
	Auditing Theory and Practice
	Income Tax Procedure
	Advanced Accounting
	Government and Institutional Accounting
	Credits and Collections
	Business Finance
	Investments and The Stock Market
	Managerial Accounting
	Bank Organization and Management
	Life Insurance
	Advanced Life Insurance
	Group Insurance and Pensions
	Statistical Methods in Business and Economics
	Managerial Statistics
	Property Insurance
	Casualty Insurance
	Marketing Principles and Practices
	Wholesaling Principles and Practices
	Retailing Principles and Practices
	Retail Advertising and Sales Promotion
	Operation Research As An Aid to Administration
	Development of a Scientific Approach to Management
	Principles of National Advertising
	Advanced Advertising
	Sales Management
	Marketing Research
	Problems in Retail Merchandising
	Marketing Problems
	Principles of Management
	Production Management
	Work Simplification and Motion Study
	Production Planning and Control
	Industrial Traffic Management
	Urban Planning and Development
	Real Estate Law
	Real Estate Appraisals
	Real Estate Finance

(Continued)

TABLE VIII. (CONT.)

Business Investigation and Reports
Area Surveys
Accounting Theory
Advanced Problems in Accounting
Advanced Income Tax Procedure
Economic Department
Principles of Economics
Business Cycle Analysis
Business Concentration
Government Control of Business
Current Economic Problems
Comparative Economic Systems
Economics for Consumers
Economics of Buymanship
Economic Development of Modern Europe
Economic Development of the United States
International Trade
Inter-American Relations
The Economics of Labor and Wage Theories
Economics of the Labor Market
Economics of Industrial Mobilization
Seminar in National Income Economics
History of Economic Thought
Advanced Economic Theory
Recent Trends in Economic Theory
Mathematical Approach to Economic Analysis
Production and Growth Economics
Business Indexes and Time Series
Intermediate Economic Theory
Money and Banking
Money and Prices
Corporation Finance
Advanced Cost Accounting
Fluctuations and Forecasting
Economics for Management
Industrial Organization
Advanced Monetary Theory
The Capital Market
Marketing
Copy Writing and Layout
Advertising Problems
Sales Promotion
Sales Control
Sales Administration
Problems and Practices of Small Business

(Continued)

TABLE VIII. (CONT.)

	Marketing Management
	Theory and Practice in Selling
	Advertising Fundamentals
	Advertising Campaigns
	The Practice of International Trade
Statistics	
	Advanced Statistical Methods
	Statistical Methods and Quality Control
	Advanced Statistical Analysis
Education	
	Audio-visual Aids for Teachers
	The American College and University
Industrial Management	
	New Business Enterprises
	Small Business Management
	Industrial Relations
	Statistical Control
	Topics in Mathematical Programming
	Financial Control
	Financial Management
	Industrial Management
Pharmacognosy	
	Distribution of Drug Plants
Pharmacy	
	Manufacturing Processes
	History of Pharmacy
	Hospital Pharmacy
	Pharmaceutical Literature
	Product Formulation
	Advanced Pharmaceutical Production
	Cosmetic Technology
Psychology	
	Statistical Methods Applied to Psychology, Education and Sociology
	Measurement of Attitudes and Public Opinion
	Industrial Psychology
	Psychology of Industrial Training
	Psychology of Work Efficiency
	Psychological Approaches to Job Analysis
	Psychology of Learning and Teaching Applied to College Work
	Psychological Foundations of Industrial Management

TABLE IX. GRADUATE-LEVEL COURSES OFFERED BY DEPARTMENTS OF PHARMACY ADMINISTRATION

Course Title	Frequency Mentioned
1. Pharmaceutical Market Analysis	1
2. Drug Marketing Methods	1
3. Pharmaceutical Marketing Case Studies	1
4. Marketing Drug Products	1
5. Advanced Marketing of Drug Products	1
6. Retail Drug Store Management	1
7. Advanced Pharmaceutical Retailing	1
8. Pharmacy Management	1
9. Retail Pharmacy Practice	1
10. Retail Management	1
11. Advanced Retailing	1
12. Regulation of Drug Trade Practice	1
13. Drug Trade Cost Accounting and Financial Analysis	1
14. Food, Drug, and Cosmetic Regulation	1
15. Competitive Practices in the Pharmaceutical Industry	1
16. Pharmacy Law	1
17. Legislative Controls of Pharmacy	1
18. Pharmaceutical Promotion and Selling Methods	1
19. Pharmaceutical Sales Management	1
20. Advanced Manufacturing	1
21. Hospital Pharmacy Administration and Operation	1
22. Pharmacy Administration Seminar	1
23. Seminar	2
24. Pharmacy Seminar	1
25. Problems in Pharmacy Administration	2
26. Special Problems	2
27. Special Topics	1
28. Management Problems	1
29. Statistical Methods	1
30. Thesis Orientation	1
31. Pharmacy Research	1
32. Research	3
33. Nonthesis Research	1

TABLE X. ACADEMIC DEGREES HELD BY PHARMACY FACULTY MEMBERS TEACHING PHARMACY ADMINISTRATION COURSES

	Ph.D.	M.S.	M.A.	LL.M.	LL.B.	B.S.	B.A.	B.B.A.
Full-Time Graduate Faculty (Pharm)	10							
Full-Time Faculty (Pharm)	2	6		1				
Part-Time Faculty (Pharm)	3	4			2	3		
Total	15	10		1	2	3		

TABLE XI. TITLE OF THESIS OR DISSERTATIONS OFFERED IN SUPPORT OF DEGREES GRANTED OR WORK IN PROGRESS

1. Massachusetts Prescription Survey, 1947 (also 1949)
2. A Study of the Pharmaceutical Detailman (1950)
3. Variations in Compounded Prescriptions U.S. 1952
4. Prescriptions for Anti-Infective Drugs, U.S., 1953
5. The Marketing of Health Accessories in Arizona
6. The Prescription Pricing Problem
7. An Approach to the Prescription Pricing Problem
8. A Comparison of Pharmaceutical Prices Under Free Enterprise, Semi-Social, and Socialized Medico-Economic Systems
9. Determination of Departmental Break-Even Points
10. Employment History of School of Pharmacy Graduates
11. Role of Self-Service in the Retail Drug Store
12. Economic Study of Pharmacies in Towns with Populations Less Than 2500
13. Prescription Department Inventory Control
14. A Procedure for Analysis of Prescription Stock Inventory
15. Customer Characteristic Determination in A Retail Pharmacy
16. Role of Personal Promotion to Pharmaceutical Sales
17. Case Study of the Value of Fair Trade to a Retail Pharmacy
18. Role of the Pharmacist in the Dissemination of Information to the Physician
19. Study of Physician Characteristics Associated with New Drug Acceptance
20. Quantitative Measurement of Prescriptions Related to Personal Promotion
21. The Growth of the Self Service Concept in Retail Drug Stores in the United States and Acceptance of the Concept in the Greater Pittsburgh Area
22. Analysis of Consumer Prescription Patronage Motives
23. Competition in the American Pharmaceutical Industry
24. Historical Evaluation of the American Drug Market Since 1900
25. Pharmaceuticals in the National Mobilization Program
26. Research as a Growth Factor in the Pharmaceutical Industry
27. An Economic Study of Prescription Departments in Indiana Pharmacies
28. A Comparison of Price Trends of Selected Drug Store Products to Standard Economic Indices, 1929-1954
29. An Evaluation of the Causes for Drug Store Failures from 1946 through 1954
30. Recruiting, Selection, and Induction of Retail Drug Personnel
31. A Study of the Model Pharmacy at the Brooklyn College of Pharmacy
32. Attitudes of Pharmacy Graduates Toward Their Profession
33. Survey of Occupations of Pharmacy Graduates Five Years Out of College
34. Methods of Administration of Relief Prescriptions in New York City
35. Problems in Hospital and Institutional Selling of Prescription Products
36. Market Analysis Methods Appropriate for a Proprietary Medicine Manufacturer

(Continued)

TABLE XI (CONT.)

37. Methods of Improving the Effectiveness of Prescription Product Makers Professional Service Representatives
38. An Analysis and Evaluation of Cooperative Drug Buying
39. Development, Use, and Marketing of Curare and Curare Derivatives
40. A Study of the Nature of Prescriptions in West Virginia
41. Development of the General Legal Philosophy Relating to Price Maintenance and its Effect on the Drug Trade

---

Don't be too much concerned with pharmacy's so-called poor public standing. It stands badly only in those communities in which the pharmacist himself has failed to render that kind of professional and civic service which every enlightened community has the right to expect of him.

Harry S. Harrison, Am. J. Pharm. Ed., 10, 209 (1946)

THE CASE METHOD IN PHARMACY ADMINISTRATION*

R. V. EVANSON

The teaching of any body of subject matter can be accomplished in many ways depending upon the nature of the material to be presented, the time allotted for presentation, specific objectives for learning such information, abilities of the teacher, and other factors *ad infinitum*. Because much or all of the subject matter in the pharmacy curriculum related to scientific work involves a knowledge of certain facts, principles, formulas, and other information capable of being consistently and continuously predicted and/or reproduced, the lecture method has been accepted and favored as the mode of instruction. To this has been added the laboratory to emphasize basic phenomena and to facilitate the learning of certain techniques and manual skills.

The nature of the general subject matter and work requires the student to have a facile memory, a willingness to submit to authoritarian pedagogy, and some degree of physical aptitude for acceptable laboratory technique. Any student of reasonable intelligence, curiosity, attention, industry, and retention ability can succeed whether or not he spends much effort in thought processes designed to promote understanding. It is possible under such a system to promote the theory of education which assumes that students should be subjected to a survey of facts and principles accumulated through the ages and presented in a neat package, abstracted to a digestible size, and spoon fed in convenient, fifty-minute doses. Learning is then evaluated periodically by measuring the degree or ratio of regurgitation evidenced by true or false, multiple choice, or fact-listing essay examinations.

There is also a body absolute of knowledge in pharmacy administration—legislative enactments, high-level court decisions, accounting techniques, mathematical concepts, statistical data, and certain economic principles—which lends well to the efficient and economical lecture system, and which can be learned second-hand by the teacher who in turn attempts to abstract the important data to be digested. However, there is some doubt that a person, who can quote sales statistics for the past fifteen years or list the various factors of layout verbatim, may be considered educated by virtue of such knowledge, be he student or teacher.

Although the excellence of pharmaceutical service to physician and patient depends to a great extent upon the scientific knowledge and skills, the ultimate success of any given pharmacy further depends upon the management and merchandising skills of the pharmacist owner or manager. Pharmacy administration, then, must offer some means of developing proficiency in these skills if it is to assume its complete function in the education of pharmacists for business management. The purpose of this report is to evaluate a method of instruction that seeks to develop proficiency in management skills which will permit the pharmacist to make the right or best decisions consistent with proper business protocol and professional ethics.

*A report of the Committee to Evaluate Teaching Methods, R. V. Evanson, Chairman, Floyd A. Grolle, and R. George Kedersha. Presented to the Section of Teachers of Pharmacy Administration, AACP, Cincinnati, Ohio, 1959.

WHAT IS THE CASE METHOD?

The case method of instruction is the use of a description "of an actual business situation which has been faced by men in practice with the facts, prejudices and opinions upon which managerial decisions had to depend. It brings into the classroom a means of placing the student into situations where, as manager or owner, he must recognize existing problems, evaluate the evidence, and act with responsibility." (1)

This method was pioneered by the Harvard Business School beginning in 1919 and stands as this School's outstanding contribution to business education. Although it has been used principally at the graduate level, it also has been recognized as an effective means of advanced undergraduate training. The basic philosophy lies in the belief that the student can develop skills in effective business management by being subjected to real-life situations which have actually occurred in retail, wholesale, manufacturing, or other business operations.

The method can be effectively applied in any course which demands (or should demand) that the student exercise his right of personal thought, opinion, and judgement based upon facts and principles rather than limit his educational objective to memorizing these facts, principles, and formulas in a sterile, intellectual environment.

HOW DOES THE CASE METHOD OPERATE?

The method depends upon the use of concrete information derived from practical experience. Therefore, it is necessary for the instructor to search out case material from the existing case literature or to go to suitable business sources for cases which will be applicable to the particular course being taught. Many case books in diversified business subjects are now published or are in the publication process. Some titles of the more important books are appended to this report; however, only two books apply to pharmacy administration. The remainder contain from one to five cases relative to pharmacy experiences, and many of these do not always lend themselves to a given course content or the instructor's objectives.

An evaluation of the present situation demands recognition of the fact that teachers who desire to utilize this method as a major part of instruction will be forced to develop many of their own cases to fit individual teaching objectives. They will have to go into the field, collect the information by interview, write up the cases in a logical or reasonable order, obtain releases from the businessmen to use the material, and establish a school file of cases relevant to conditions predominant in the areas served by the school and to the courses taught by the case method.

Cases, by whatever means obtained, are assigned to the students verbally one period prior to discussion (or a semester outline can be used) to permit reasonable home study. Complete adoption would approximate the assignment of one case per period with an occasional long case covering up to three periods. The situation is then discussed at length in class. In fact, an assignment without discussion renders the method as sterile as any condition which might now exist under other methods of teaching.

The method is designed basically to place the responsibility for learning upon the student by permitting him to solve the situation through democratic processes of open discussion before and during the class period, and to remove the responsibility of teaching from the instructor. Instead of being an authoritarian dictator or preacher of dogmas, statistics, theories, and fundamental

principles, the professor becomes an instrument of learning in the form of a discussion leader, resource person, helpful expert, and summarizer.

Cases for written analysis should be assigned only after the class has had reasonable practice to demonstrate orally its ability to tackle a case. However, written assignments should be kept to a minimum to permit more use of study time for analysis prior to class discussion. Every written assignment should be discussed to some degree in class after completion of the work.

Greater success of operation occurs when the group is controlled within a range of thirty to sixty students. This range creates no hardship for the median-sized school, but for those schools with classes of ten to fifteen or over sixty, the net value may suffer. The small groups have too few of the better students who are thinkers and hence lack sufficient diversity of opinion. The larger groups have greater potential for top-level talent but are unwieldy for proper opportunity per student. An attempt to limit discussion to small groups within a large class of 100 students restricts individual motivation to participate, limits the contribution of ideas, and can become boring to the class as a whole. Proper administration, therefore, will necessitate the division of classes into sections of forty to fifty students each and will increase the contact teaching load of the instructor without increasing total preparation time above that necessary for one section.

It is necessary to emphasize at this point that, at the outset, the total preparation time will be increased above that normally spent under the lecture method during the change-over semester for each class so changed. Use of the case method demands that the instructor be fully aware of the contents of the case material and of all the applications and implications suggested by the nature of the issues involved. Whereas under the lecture method the instructor can restrict discussion and comment to the topic being considered, under the case method he must be ready for anything which comes up in class on the spur of the moment. Thus he must have a broader background upon which to draw in order properly to lead the discussion into the correct solution, conclusion, or generalization, or to prevent erroneous solutions and conclusions where no action can be justified or no solution is feasible under the circumstances.

SPECIFIC PROBLEMS AND CONSIDERATIONS

Responding to a request for comment from teachers known to be using this method, one professor stated: "The case study method is an acceptable one for teaching the *application* of business principles. However, the student must have a knowledge of the principle to be applied before attempting a solution to a case. The pharmacy student's lack of foundation in the field of business requires considerable concentration on basic principles. This leaves little time for case studies at the undergraduate level."

This problem is substantiated further by the fact that some pharmacy curricula require no formal course work in economics, accounting, social sciences, or other courses which serve to broaden the student's understanding of basic knowledge. A professor in one of the major Big Ten universities reported that:

a. only one student had had an accounting course prior to management,
b. less than one-half of the class had taken economics,
c. none of the students had taken a course in marketing, and
d. less than one-half of the class had any type of retail or business experience.

Another professor referred to the use of the *Casebook in Pharmacy Management* by stating that: "The students do not have enough background in accounting, management, or retailing to actually do an acceptable job of presenting the

case as I am sure the author intended it to be handled." It seems that some workable combination of case application and basic instruction is necessary to achieve reasonable course objectives under existing conditions.

Course content and objectives pose further hurdles. Every course should be outlined in a logical sequence to demonstrate a definite plan of progressive and integrated instruction. It is necessary that case material be available to expand each subject area included in the outline. To date there is no one source of case studies for any given course in pharmacy administration which provides a graduated degree of progression to fit a logical course sequence.

If the preceding statement is correct, the instructor must search out other published cases or attempt to collect his own material to fit his course outline. Although this latter procedure may seem to be easily done, case collecting is both time consuming and expensive. The majority of schools have only one person to teach all pharmacy administration courses, so that teaching loads do not allow much time for field research, assuming that finances were readily available to underwrite such a project in each school.

Student enthusiasm and morale are always problems for teachers. The general reaction from those teachers who have used the method indicates a desirable level of enthusiasm which ranged from: "In general my students were not antagonistic toward the method; however, they gave no evidence of enthusiasm" to "The students were very enthusiastic about the method, enjoyed the cases, and participated in the discussions." Because the successful use of case teaching depends upon students accepting the responsibility for learning via personal analysis and class contribution, it is necessary to stimulate enthusiasm through proper administration, leadership, and enthusiasm on the part of the instructor.

Efficiency must also be considered along with enthusiasm and morale because it can affect them directly and be affected directly by them. The method has been described by an authority on its use as "inefficient, crude and clumsy in execution." (2) Whereas the lecture method can efficiently catalogue and present the material in a systematized manner and sequence, always moving forward at any pace the instructor chooses to move, the case method can bog down for lack of discussion, general class apathy, domination by a few students, or an initial reaction of frustration which is never quite overcome. Even during a well-executed discussion there will always be some students who can never quite fully comprehend all that is evolving from the experience.

There is also a lack of efficiency in the evaluation of learning. Instead of the usual examinations with neatly recordable answers which in sum fit a grading curve or a minimum standard of test points, "no scale of accomplishment can be established and empirically applied." (2) The student, until he learns to work for knowledge and skill rather than a grade, flounders—not knowing exactly what he is learning, and, if he is learning, whether he is getting the right material from the case. The instructor's responsibility in student evaluation is greater than normal because his judgement of performance and ability must be made on factors not always readily discernible.

Another consideration is student finance. Under present conditions it is necessary to use a standard text plus a case book. This procedure requires an expenditure of ten to fifteen dollars for textbooks per course, which in itself raises certain barriers and criticisms from some students, instructors, and textbook committees relative to the cost of education. If the books are not coordinated, or are not fully used, the real cost of actual use is much greater. Consequently, the situation gravitates toward using one book or the other as the

required purchase and then filling in either standard text or case material as needed to complete the plan of instruction.

The Committee wishes to point out the fallacy of the expense excuse, if such an excuse exists. There are many courses in pharmacy for which texts, laboratory manuals, and special equipment require expenditures of $20 to $30 per semester or per year. The materials are necessary to proper instruction and learning. If a student is to learn management skills based upon sound principles, it becomes necessary to have the proper text tools to do the job. The lack of such tools will—in the long run—prove more costly in terms of a lack of management ability than the price of many textbooks.

Excellence of student performance demands resource material. The Committee makes no comment upon library facilities for pharmacy administration subject matter. It merely wishes to emphasize that teaching by the case method demands an available source of reference materials in management, marketing, merchandising, accounting, law, economics, etc., of a quantity and quality to provide the background in both classical and contemporary theories and practices as well as historical and current facts and data.

A problem expressed by all teachers is that of time. To offer the needed background material and to permit efficient use of case instruction, all are aware of the necessity for additional class hours. One instructor stated: "Up until this summer the curriculum has been so tight that it was impossible to use casework in the management courses. Fortunately, we now have an additional unit, and plan to use casework in the expanded course." Perhaps the desired extra hours will become available in the five year program to permit the greater use of case teaching. However, this problem has been partially solved by some teachers under current conditions by using from twelve to fourteen weeks for general instruction followed by two to four weeks of concentrated case studies. Others report sectioning the work and using cases at the end of each section to emphasize important aspects of the current material.

A final problem for some instructors is the general attitude of some of the administrators and faculties toward the total pharmacy administration program. It has taken many years and hard work for some teachers to have their programs accepted and respected by both deans and faculties. Some antagonism still exists which is evidenced by open statements, cool complacency, failure to expand and develop course offerings, and general lack of cooperation. If such conditions do exist in a school, to break away from accepted pedagogical practice may not be done easily, especially if a change would require certain expenditures for field research to build a working case file.

SUMMARY

The case method of teaching has been briefly described and compared with the lecture method now most widely used in pharmacy schools at the undergraduate level. The general operative procedures have been discussed and evaluated. These procedures include: (1) methods of collecting cases, (2) oral and written assignments, (3) the instructor's status as an instrument of learning, (4) ideal and acceptable class sizes, and (5) instructor preparation.

Specific problems of teaching and administering the case method have been evaluated in terms of current circumstances, opinions and prejudices. These problems include: (1) the general lack of background now found in the average undergraduate pharmacy student; (2) the lack of text material organized in a logical, progressive sequence completely utilizing case techniques; (3) the poten-

tial inability of individual instructors to find time and money to establish case files in the immediate future; (4) the necessity for student enthusiasm; (5) the level of efficiency inherent in the case method of instruction; (6) student finance related to multiple texts; (7) the need for expanded library requirements and facilities; (8) the need and possible curriculum expansion for additional class hours and multiple class sections; and (9) the potential effect of a lack of academic acceptance for pharmacy administration.

CONCLUSIONS

1. The case method is a desirable instructional tool designed to simulate real, life-like business situations, the study of which leads the student to purposeful, analytical, and constructive thinking; and to the effective utilization of interrelated, factual knowledge for the purpose of developing both administrative knowledge and skills characterized by the ability to make decisions indicative of sound judgement.

2. Although a desirable tool, it is not likely that the case method will be adopted to the extent that undergraduate pharmacy administration courses will become "case courses" at the present time or in the immediate future.

3. One of the retarding factors in the use of the case method is a general lack of suitable cases related to pharmacy's specific and general problems and presented in a printed sequence or order consistent with current teaching concepts and course outlines.

4. Pharmacy students in general have insufficient background knowledge to comprehend effectively the facts and issues inherent in administrative and other business problems.

5. Pharmacy administration courses at the undergraduate level will at best be taught as combination lecture-case study courses within the foreseeable future of the four year program and the initial years of the five year program.

6. Proper recognition for pharmacy administration in the five year curriculum by a minimum of eighteen credit hours may permit the opportunity for many instructors to carry out a case-study program in the second units of two-unit courses, preferably in the areas of management and marketing.

RECOMMENDATIONS

1. The Committee endorses the case method and recommends its use as a progressive means of effective instruction in pharmacy administration courses at all levels.

2. In lieu of completely case-oriented courses, the Committee recommends a balance of lecture periods and case discussions consistent with the knowledge and ability of a given class, the availability of case material, the ability of the instructor, and the pedagogical policies of schools as related to academic acceptance and instructional methods.

3. The Committee further recommends that the Conference of Teachers of Pharmacy Administration consider the establishment of a "Case Pool" within the framework of its committee structure, the purpose of said "Case Pool" being to serve as a central file of cases collected by its members, published or unpublished. Cases so collected would be available to all member schools. The details of this project would be determined by the proper committee, subject to approval by the members of the Conference and the Council, and would necessarily include publication protection for each case and author.

REFERENCES

(1) Grolle, Floyd A., *Am. J. Pharm. Ed.*, 22, 512 (1958).
(2) Dewing, Arthur S., "The Case Method at the Harvard Business School," McGraw-Hill, New York, N.Y., 1954, p. 3.

ADDENDUM

Partial List of Case Books Available for Text and Reference Use

The following list of books is available for use as textbooks and/or references for individual cases for class discussion. This list is by no means complete, but it will serve as a starting point from which each instructor can build a personal file or library file for teaching by the case method.

Pharmacy Teaching:

Arthur, W. R., "The Law of Drugs and Druggists." West, 1955, 379 p.

Grolle, F. A., "Casebook in Pharmacy Management." Edwards, 1958, 199 p., $4.60.

Pharmacy Reference:

Burlev, O. E., Fisher, A. B. and Cox, R. G., "Drug Store Operating Costs and Profits." McGraw-Hill, 1956, 535 p.

Dierson, F. T. and Dunn, C. W., "Product Liability Cases. Comm. Clearing House, 1955, 1117 p.

General Teaching and Reference:

Alt, A. M. and Bradford, W. C., "Business Economics, Principles and Cases." Irwin, 1951, 581 p., $7.35.

Andrews, K. R., "Case Method of Teaching Human Relations and Administration." Harvard University Press, 1953, 271 p., $4.50.

Blankertz, D. F. and Others, "Cases and Problems in Marketing Research." Ronald Press, 1954, 339 p., $5.00.

Bays, A. W., "Cases and Materials in Business Law." Bobbs 1949, 1313 p., $7.75.

Bogert, G. G., "Cases on the Law of Sales." Foundation Press, 1956, 770 p., $9.00.

Boyd, H. W. and Westfall, R., "Marketing Research: Text and Cases." Irwin, 1956, 675 p., $6.75.

Calhoon, R. P. and Others, "Cases on Human Relations in Management." McGraw-Hill, 1958, 444 p., $6.00.

Canfield, B. R., "Salesmanship: Practices and Problems." McGraw-Hill, 1958, 573 p., $6.50.

Cannon, J. T. and Wichert, J. A., "Marketing: Text and Cases." McGraw-Hill, 1953, 627 p., $6.00.

Carpenter, W. H., "Case Studies in Collective Bargaining." Prentice-Hall, 1953, 465 p., $4.95.

Conrad, A. F., "Cases and Materials on the Law of Business Organization." Foundation Press, 1957, $9.50. (Includes information regarding Agency, Employment, Partnership, Joint Enterprises and Ventures.)

Faville, D. G., "Selected Problems in Retailing." Prentice-Hall, 1956, 244 p., $3.95.

Frey, G. F. and Buteux, R. D., "Current Readings in Marketing." Printer's Ink, 1957, 238 p., $3.65. (May be used as reference material to point out background for case discussions.)

Greif, E. C., "Modern Salesmanship, Principles and Problems." Prentice-Hall, 1958, 550 p., $9.00.

Grimshaw, A., "Problems of Independent Businessmen." McGraw-Hill, 1955, 403 p., $6.50.

Haas, K. B., "Case Problems in Creative Salesmanship." Prentice-Hall, 1953, 315 p., $2.50.

Hansen, H. L., "Marketing Text, Cases and Readings." Irwin, 1956, 799 p., $6.95.

Hunt, P. and Williams, C., "Case Problems in Finance." Irwin, 1953, 510 p., $6.00.

James, L. K., "Cases and Materials on Business Associations." Bobbs, 1949, 1313 p., $7.50.

Johnson, A. W., "Case Problems in Auditing." Rinehart, 259 p., $4.00.

Juran, J. M. and Barish, N. N., "Case Studies in Industrial Management." McGraw-Hill, $5.00.

Kelley, P. C. and Lawyer, K., "Case Problems in Small Business Management." Prentice-Hall, 1952, 258 p., $3.80 ($2.85 to schools).

Lazo, H., "Case Histories of Successful Marketing." Funk, 1949, 261 p., $4.75 (Ryerson Press, $6.25).

Lockley, L. C. and Dirksen, C. J., "Cases in Marketing." Allyn, 1954, 322 p., $3.95.

McGregor, C. H., "Retail Management Problems of Small and Medium-Sized Stores." Irwin, 1957, 267 p., $3.50.

McGregor, C. H., "Retail Management Problems." Irwin, 1953, 231 p., $4.65.

McNair, M. P. and Hansen, H. L., "Problems in Marketing." McGraw-Hill, 1949, 718 p., $6.00.

McNair, M. P. and Hersum, H. C., "Case Method at the Harvard Business School." McGraw-Hill, 1953, 292 p., $5.00.

McNair, M. P. and Others, "Cases in Retail Management." McGraw-Hill, 1957, 806 p., $10.00.

McNair, M. P. and Others, "Problems in Marketing." McGraw-Hill, 1957, 740 p., $7.00.

McNair, M. P. and Hansen, H. L., "Readings in Marketing." McGraw-Hill, 1956, 559 p., $6.50. (For reference use.)

McLarney, W. J., "Management Training Cases and Principles." Irwin, 1955, 319 p., $5.50.

Oppenheim, S. C., "Cases on Unfair Competition." West, 1948, 1339 p., $10.00.

Pirsig, M. E., "Cases and Materials on Legal Ethics." West, 1949, 208 p., $3.50.

Printer's Ink, "Case Histories of Successful Advertising." Funk, 1949, 296 p., $4.75.

Raymond, T. C., "Problems in Business Administration." McGraw-Hill, 1955, 373 p., $5.50.

Richert, G. H. and Stoner, J. K., "Retailing Problems and Projects." Gregg, 1953, 213 p., $1.72.

Shattuck, L. A. and Bradley, J. F., "Problems in Business Finance." Rinehart, 1954, 67 p., $ .95.

Shaw, A. W., "Some Problems in Market Distribution." Harvard Univ. Press, 1951, 119 p., $2.50. (Illustrating the application of a basic philosophy of business.)

Simpson, R. G., "Case Studies in Management Development." Amer. Management Assoc., 1954, 140 p., $2.50.

Spencer, W. H., "Casebook of Law and Business." McGraw-Hill, 1953, 968 p., $8.00.

Terry, G. R., "Case Problems in Business and Industrial Management." Brown, W. C., 1949, 170 p., $2.50.

Still, R. R. and Cundiff, E. W., "Sales Management: Decisions, Policies and Cases." Prentice-Hall, 1958, 722 p., $10.00.

Van Sickle, C., "Cases in Cost Accounting." Prentice-Hall, 1955, 422 p., $4.75.

Westing, J. H., "Readings in Marketing." Prentice-Hall, 1953, 322 p., $5.25. (For reference use.)

Wingate, J. W. and Corbin, A., "Changing Patterns in Retailing." Irwin, 1956, 393 p., $5.00. (For reference use.)

Anthony, R. W., "Management Accounting: Text and Cases." Irwin, 1956, 511 p., $6.50.

Taggart, H. F., "Cost Justification." Univ. of Michigan, 1959. (Casebook on pricing and the Robinson Patman Act and the FTC.)

Alderson, W., "Marketing Behavior and Executive Action." Irwin, 1957. (For reference use.)

Boyd, H. W., Clewett, R. M. and Westfall, R., "Contemporary American Marketing." Irwin, 1957, 305 p. (Readings on the changing market structure.)

A great struggle going on in the world today—significant and for the most part carried on in silence—is the struggle for the possession of the minds of youth of superior ability.

Edward C. Elliott, Am. J. Pharm. Ed., 10, 444 (1946)

PHARMACY ADMINISTRATION, ITS ASSETS AND LIABILITIES*

JOSEPH H. KERN

Recognition of the need for Pharmacy Administration by the Pharmaceutical Survey in 1948 gave impetus to this area as a vital and integral part of pharmaceutical education. The Teachers Seminar held at Ohio State University in 1951 brought together those who fostered the concepts of pharmacy administration as we know them today. The composition of this area as recommended by this group, namely economics, accounting, marketing, management, and law, remains unchanged. Undoubtedly history will record this period as one of transition, there is, however, ample evidence that more progress has been made in pharmacy administration in the last ten years than at any other time in its history.

Those who have been and are associated with this area can be proud of the part they have played in perpetuating it. The teachers of pharmacy administration as well as other interested individuals have expended a great deal of time and energy in furthering the progress of this youngest member of the pharmaceutical family. Studies and investigations pertaining to the improvement of the undergraduate curriculum and the development of a graduate program have been continuous, and there have been many other reports on other facets of this area. The business area of pharmacy has received a great deal of attention because of the five year program, and in turn greater emphasis is placed on the five year program because of pharmacy administration.

As we stand on the brink of a new era of pharmaceutical education we must be ever mindful of increasing responsibilities. This is the opportune time to consolidate our forces, to look back for a moment and see from where we came, but most important to look ahead in order that we might see where we are going. Pharmaceutical education is being offered a unique opportunity to develop the type of program that will assure the American public of a well-trained individual who will render the highest type of professional services, in the best economical and business atmosphere and at the same time be ever conscious of his social environment.

In composing a list of the assets and liabilities of pharmacy administration there appears to be four major items for consideration, they are:

1. Personnel
2. Equipment
3. Curriculum
4. Enrollment

The apparent lack of teachers in pharmacy administration has supposedly retarded the growth of this area. Since its inception this has more often than not been the excuse for its neglect on the part of administrators. Most of us will agree that the minimum requirements for a teacher of pharmacy administration should be a Bachelor of Science degree in pharmacy and a doctorate in

*Presented to the Section of Teachers of Pharmacy Administration, AACP, Cincinnati, Ohio, 1959.

pharmacy administration. A review of the "Roster of Teaching Personnel in Colleges of Pharmacy" is most revealing. Among all the member colleges it is possible there are fifteen faculty members that approach the requirements mentioned above. The approximately sixty other colleges appear to assign the pharmacy administration subjects to members of the faculty who are ill prepared, if prepared at all, to teach in this area. For the record it should be pointed out that reference is not to the individual or the teachers but to prevailing conditions.

History and time seem to fortify the concept that a good teacher at both the undergraduate and graduate level is one who is creative and original and has been exposed to the disciplines and philosophies of a doctorate program. If the Ph.D. is the passport to pharmaceutical education and the teachers and the area of discipline are to be judged by this standard, then the teachers of pharmacy administration had better give serious consideration to their citizenship in this academic country. The situation is not a healthy one. There are those who are in agreement with what has just been said; however, they make little or no effort to encourage or aid in the development of a graduate program that in time would assure them of the caliber of teaching they claim to seek. On the other hand there are those who merely offer lip service and go through the motions for the sake of satisfying recommended standards of pharmaceutical education.

Pharmacy administration must be ever conscious of the conditions as they exist and never lower its guard, not even for the sake of overcoming situations as mentioned above. The foundation of pharmacy administration built on blocks of insincerity would never weather the element of time. Graduate programs in this area must be developed to explore the basic concepts of pharmacy administration, and until this is an accomplishment there will be no permanent foundation upon which to build. You, who are fortunate enough to be directing graduate research in pharmacy administration are real pioneers; however, if some of you persist in ignoring the basic problems the foundation may not be a permanent one. The literature of this area which is almost nonexistent must be conceived in the depths of basic research; this is the only real foundation.

Without the support of the administrators of the schools and colleges pharmacy administration merely occupies space in the catalogue. It is all too apparent in many incidents that the position of the teacher of pharmacy administration is the last item in the budget and the catch-all of the teaching load. Conditions such as these will not attract young people to this teaching area. Pharmaceutical education is dependent on the young teachers. The young teachers need all the encouragement, help, and guidance they can obtain; theirs is a dynamic world requiring an environment in which they can express themselves, right or wrong.

If present-day attitudes continue to permeate pharmaceutical education, the area of pharmacy administration will undoubtedly be lacking in properly trained personnel for the next fifty years.

It seems somewhat presumptuous to consider equipment in light of the personnel problems. Unlike the other areas of pharmaceutical education, pharmacy administration has required little or nothing from the budget for equipment and supplies. The teachers of pharmacy administration in planning for the future should give serious consideration to the establishment of a retail pharmacy laboratory. The physical requirements of such a laboratory should be much the same as those found in a retail pharmacy with a great deal of thought to the future. The laboratory should consist of the type fixtures used in a retail

operation and so constructed as to be mobile. The fixtures could be used to a great advantage in working out various problems pertaining to store layout, and rearranging or remodeling a store. The functions of various types of fixtures could be observed first hand, the construction, cost, maintenance requirements, and other facets could be considered. Merchandise would be a vital part of the laboratory equipment; cash registers and other necessary equipment and fixtures should be accessible to the students. In those schools that teach their own accounting, proper space and equipment must be provided. Special attention should be given to tables or desks for the convenience of pharmacy accounting students; adding machines or similar equipment should be considered. Today several schools use some of the above-mentioned items, and others planning for the future are considering their possible use. This is not enough; all must give equipment and its use a great deal of study in light of the needs of the students.

A re-evaluation of the contribution of pharmacy administration to the over-all pharmacy curriculum should be of concern. It is becoming more and more apparent that our present-day thinking must undergo some change. In working with and developing the five year curriculum one becomes more convinced that pharmacy might soon be considering a further extension of time for its educational program. A six year program could be a reality in the not too distant future.

The fifteen to eighteen semester hours of pharmacy administration course work advocated as its part of the five year curriculum does not appear to be out of order; however, the increasing emphasis on all the subjects in the pharmacy administration area from without is good evidence that it will only be a short time before we must reconsider the need for more hours in the business area. The price-conscious consumer, inquisitive legislators, the invasion of government into drug distribution and research, the ever-increasing cry for more legal restrictions on the practice of pharmacy, all necessitate another look at the amount of time required to acquaint the student, the future pharmacist, with his professional and economical responsibilities. It is not outside the realm of possibility that by 1975 a six year curriculum will consist of twenty-five semester hours of course work in the area of pharmacy administration.

Enrollment in the colleges and universities has been a topic of much conversation. The schools and colleges of pharmacy will undoubtedly get their share of the predicted increase, and it is doubtful if a five or six year program will be a deterrent. Recognizing our assets and liabilities, it is our responsibility to be prepared to meet our students with the very best that can be obtained. It should be rewarding to see the names of former students as employers and/or employees of successful pharmacies. It will be more gratifying to see their names on the rolls and as officers of local, state, and national organizations working for the betterment of our profession; all these are acceptable signs and traits of one who has received a good, sound education. Pharmacy administration will only progress as rapidly as we permit it. Its future is the responsibility of its teachers. Personnel is its greatest asset, the lack of, its greatest liability.

There can be no great profession without great professional schools.
Lloyd E. Blauch, Am. J. Pharm. Ed., 12, 250 (1948)

THE TEACHING OF STORE LAYOUT PRINCIPLES TO PHARMACY MANAGEMENT STUDENTS*

ARTHUR C. LYTLE, JR.

One of the challenges presented to the pharmacy management instructor is that of developing within the student an enthusiasm and respect for the subject matter such as that held for the other professional courses. Although his background may include courses in economics, drug marketing, and accounting, most of the student's interest and attention throughout the curriculum have been given to the more rigorous demands of scientific course work. In such an environment, the instructor must find ways to make pharmacy management "come to life" in the classroom if the student is to be properly motivated.

The dangers of teaching the course on an exclusive textbook-lecture basis are fairly obvious, since the student may view the material as little more than a collection of definitions and generalities sprinkled with a few facts. As other authors have pointed out (1, 2), it is desirable to use a combination of lectures, reading assignments, case problems, and field projects in order to make the study of management stimulating and meaningful to the student.

There are several opportunities for challenging the ability of the student during the initial weeks of the course. The subject of location analysis, for example, is ideal for case discussion and field project treatment. Supplementary teaching materials are also available (3). The subject of store financing presents similar opportunities, since it is of more than usual interest to the student. This topic can be treated realistically with the use of financial schedules, as proposed by Greenberg and Kreiser (4). Since the student usually has an accounting background, case problems can also be employed to good effect.

The next segment of the course usually deals with store organization, including planning and layout engineering. This phase should not be isolated from the subject matter previously covered, since location analysis, financing, and store planning are interrelated activities. As the student realizes the necessity for correlating the various elements of the course, he begins to appreciate the challenge of management.

To develop the student's awareness of the value of management theory in retail practice, the field project proposed by Jeffries (5) has particular value. In this assignment, the student assumes the role of consultant and is required to analyze and evaluate the layout, fixtures, and merchandising in an operating pharmacy. If the student has been adequately prepared for this task, the project can be the highlight of the course.

It is the purpose of this paper to outline the subject matter to be covered and to discuss teaching aids which can be utilized in presenting the principles of store planning to the management class.

INTRODUCTION TO STORE PLANNING

To approach the subject of store planning in its proper perspective, the instructor should review the economic, social, and professional factors which have given rise to the "new look" in drugstore design. Population shifts, changes

*Presented to the Section of Teachers of Pharmacy Administration, AACP, Cincinnati, Ohio, 1959.

in consumer buying power, preferences, and shopping habits have contributed; as have the forces of research, product development, and advertising. In response to these and other factors, the traditional retail pharmacy has undergone a major transition: it is larger, brighter, more colorful, and departmentalized; it carries broader merchandise lines, utilizes open display, and self-service selling techniques, yet retains professional identification.

An over-all view of the changing patterns in retail pharmacy can be effectively presented with the use of sound filmstrips such as *Druggist or Pharmacist, Merchandising for Moderns,* and *Your Customers Are Talking About You,* which are available for classroom use.

The filmstrip presentations should be coordinated with special reading assignments which treat the elements of drugstore design and layout engineering in depth. The Johnson and Johnson manuals, *Your Front Forecasts Your Future* and *Stop, Look and Listen,* are particularly useful, as are the articles by Beall (6, 7), St. John (8), and Peterson (9). With this background the student is prepared for classroom discussion of store layout principles and their application to different types of retail pharmacies.

THE PRINCIPLES OF LAYOUT PLANNING

If the pharmacy is to be effectively planned from an investment point of view, the entire area, including nonselling space, should function as a mechanism designed for maximum production of a product—profitable sales. From a professional point of view, the layout should function as an environment suitable for the practice of pharmacy. The individual owner typically wishes to satisfy both objectives.

If he is to obtain the highest dollar volume per square foot at the lowest investment and overhead cost per sales dollar, he must observe the following principles of layout engineering: (5, 10)

1. Maximum utilization of available space.
2. Avoidance of dead areas and waste space.
3. Departmentalized merchandise with space allocated on the basis of sales and profit potential, merchandise turnover, displayability of goods, and contribution to sales of other departments.
4. Payroll control: planning for proper clerk coverage within payroll limitations imposed by overhead limits.
5. Controlled customer circulation and traffic flow: via proper placement of merchandise departments, fixtures, aisles, as well as color and lighting engineering.
6. Customer convenience: conforming layout and merchandise arrangements as much as is possible to customer preferences.
7. Surveillance: planning strategic location of service areas to afford store protection.

APPLICATION OF LAYOUT PRINCIPLES

Because of differences in professional, service, and merchandising objectives, it is desirable to divide retail pharmacies into three classes—professional pharmacies, traditional drugstores, and super drugstores—for purposes of layout discussion. Each of these store types has characteristic sales and service requirements, merchandise departments, and layout patterns which can be delineated by

various teaching methods. If possible, the instructor should schedule a field trip to an exclusive prescription shop, to different types of traditional drugstores (e.g., secondary shopping district, neighborhood, suburban), and to both chain and independently operated super drugstores to enable the student to observe and contrast the store atmosphere, spatial characteristics, departmental emphasis, and layout styles in each example.

The field trip has distinct advantages as a teaching aid, in that:

1. It takes the student into the dynamic atmosphere of different types of retail pharmacies.
2. It exposes him to the fixture, sales, and merchandise requirements for the various departments usually included in a retail pharmacy, including the prescription, packaged medicines, cosmetics and toiletries, tobacco, photo, baby, household goods, toy, magazine, and soda fountain departments.
3. It can be used to demonstrate the concepts of departmental identification, traffic control and dispersal, color and lighting engineering, display techniques, and, most important, the utilization and limitations of the self-service principle in a retail pharmacy.
4. It can serve to illustrate the layout styles in current use, including the conventional or clerk-service layout, the self-selection layout, the "off-the-wall" layout, the "center service" layout, and the "lobby check-out" layout (6).

In addition to the field trip, the instructor should use audio-visual aids, including films, color slides, and photographs, to facilitate the discussion of layout planning. In this connection, I have devised a series of layout diagrams which demonstrate the application, as well as violation, of layout principles in different types of retail pharmacies. Using a different color to represent each department (prescription department—blue, cosmetics—yellow, soda fountain—red, etc.), the diagrams effectively illustrate the theories of layout engineering for controlled customer circulation. The diagrams also depict "problem situations" created by such factors as space limitations and building shapes which necessitate compromise with the principles of good design. Inasmuch as the diagrams have been a valuable teaching aid, the series has been photographed and is available in a set of twenty color slides (35 mm.) to other pharmacy management teachers.

Classroom discussion of other facets of store planning, such as the store front, provision for storage and other nonselling areas, and the wiring and plumbing diagrams, can also be enhanced with visual teaching aids. The instructor should emphasize the importance of developing a complete plan, including the above elements, prior to negotiating the lease and starting construction, since changes may be costly or otherwise prohibitive. The student should also be made aware of the services available from layout specialists employed by fixture and wholesale concerns, since the latter individuals offer assistance in all phases of planning and executing the layout. It should be made clear that drugstore design is a complex activity that must be approached with careful study to create a store which will operate at peak efficiency.

By utilizing the teaching approach outlined above, the over-all aspects of store planning as a science and an art can be effectively presented to the student. As a personal observation, it is felt that perhaps the greatest value of the store-planning sequence of the course, when presented in this fashion, convinces the student that the scientific approach works in management too.

REFERENCES

(1) Jeffries, S. B. and Isidore Greenberg, *Am. J. Pharm. Ed.*, 20, 215 (1956).
(2) Grolle, F. A., *ibid.*, 22, 512 (1958).
(3) "Drug Store Location Analysis," McKesson & Robbins, Inc., New York, N.Y., 1959.
(4) Greenberg, Isidore and Abraham Kreiser, *Am. J. Pharm. Ed.*, 22, 502 (1958).
(5) Jeffries, S. B., *ibid.*, 21, 426 (1957).
(6) Beall, C. R., *J. A. Ph. A., Prac. Ed.*, 19, 210 (1958).
(7) Beall, C. R., *Modern Prescription Department Design*, McKesson & Robbins, Inc., New York, N.Y., 1959.
(8) St. John, L. A., *J. A. Ph. A., Prac. Ed.*, 18, 670 (1957).
(9) Peterson, L., *Cent. Pharm. J.*, 2:5, 28 (1957).
(10) "Store Planning," *Self Service Store Management Training*, Unit 3, Walgreen Drug Stores, Chicago, Ill., 1957.

. . . any profession that is worthy of the name in modern times engages in and supports research and creative activities in its field of service. It cherishes its imaginative minds and creative talent.

Lloyd E. Blauch, Am. J. Pharm. Ed., 12, 248 (1948)

THE LYNN INDEX, A REPORT OF PROGRESS

MAYNARD W. QUIMBY

The *Lynn Index* is an annotated bibliography of phytochemistry being published as a continuing series of monographs by the Massachusetts College of Pharmacy.

ORIGIN AND DEVELOPMENTS

The late Dr. Eldin V. Lynn, Chairman of the Department of Chemistry at the Massachusetts College of Pharmacy, spent many years searching the literature for references to phytochemistry. The results of his work are to be found on some 80,000 index slips at the Massachusetts College of Pharmacy. The coverage extends into 1954. This collection has come to be known as the "Lynn File," and it contains perhaps more entries than any other similar bibliography in existence. The file is, in fact, three files rather than one, and all citations and other data are recorded in Dr. Lynn's own handwriting on 3½" x 6" slips.

The file was set up in three sections organized essentially as follows:

1. An alphabetically arranged generic index of plants investigated, with the results of the investigation, the names of the authors, and the dates of their work.
2. An alphabetical listing of pure substances, mixtures, and classes of materials reported to occur in plants, with references to the original works.
3. An alphabetical listing, by year, of authors, and complete bibliographic citations of their works.

John W. Schermerhorn and Maynard W. Quimby of the Massachusetts College of Pharmacy faculty undertook the organizing and editing of the material for publication as *The Lynn Index*. This work has been going on since June, 1957, under a two-year grant furnished by Smith Kline & French Laboratories. This grant has now expired.

During a considerable part of the first year of this work the editors were engaged in organizing this material into a permanent and usable form. As a necessary starting point a format had to be devised. Many persons and many groups were consulted, and much valuable advice and guidance were received. The final product is, indeed, a distillate of many of their suggestions.

When completed, this work will probably consist of at least sixty monographs including a consideration of fifty-two orders of vascular plants, as well as a great deal of material concerning the algae, the fungi, the lichens, and the mosses. Of the higher vascular plants alone there are more than 220 families, 2,400 genera, and an undetermined number of species.

Because many investigators failed to indicate the family to which a given plant belonged, the editors' first step was to make these assignments. Some misspellings of scientific names, some use of common names, and even the inclusion of a few animal products made this task extremely difficult.

The final phase of this part of the work was the actual organizing of the material in monograph form. Since the bibliography was to be annotated, it was necessary to group together similar reports on a given plant. Where many studies had been made on a particular plant, this grouping proved difficult. And

finally, all references had to be checked for accuracy. This checking was complicated in many cases because of the inclusion of several references in a single bibliographic citation.

In its finished form a monograph consists of a series of "chapters," each one representing a plant family. Each family consideration includes an introductory portion consisting of a discussion of certain important botanical features of the family and a brief consideration of what is known of its chemical constituents. The generic names and specific epithets used are those that appeared in the Lynn File. Spelling corrections, however, have been made wherever they were necessary. Author citations are included in the monographs only if they appeared with the scientific names in the generic file. Immediately following each scientific name are placed any other scientific names by which the plant has been known, and such names are cross-referenced in the appropriate places. Common names reported in studies on a particular species follow, and brief abstracts of the work performed are given. A bibliography makes up the last portion of each "chapter" or segment of a monograph. In it are included the references cited in the respective annotations. Often these references are considerable in number.

To use any of these monographs to the best advantage the following procedure is suggested:

1. Determine from the mimeographed master list the order and family to which a particular genus has been assigned.
2. Select the proper monograph and locate the genus alphabetically arranged.
3. Find the desired species alphabetically listed in the correct genus.

Occasionally an investigator has not identified a plant well enough for accurate classification. These plants have been placed in a miscellaneous group either at the end of the genus or at the end of the family.

Each monograph is concerned with species from a single plant family or from a group of related families.

From time to time new master lists (generic indexes), mentioned above, will be issued, listing in alphabetical order the families in which the genera have been placed. At the completion of the work all of these will be combined in a single master index.

The editors are unable to predict with any degree of certainty when the present phase of the work will be completed. Finally, the chemical file will be assembled as the last link in this work. The user will then be able to determine either what work has been performed on a given plant, what substances have been reported in the plant, or *what plant or plants contain a substance in which he may be particularly interested.*

As individual monographs are published copies of them are being made available by the Massachusetts College of Pharmacy at a nominal price.

PROGRESS TO DATE

Progress to date is as follows:

a. Up to this time (June 22, 1959) three monographs have been published. They are:

Monograph I dealing with the order *Centrospermae* and including plants of the following seven families: Aizoaceae, Amaranthaceae, Caryophyl-

laceae, Chenopodiaceae, Nyctaginaceae, Phytolaccaceae, and Portulacaceae.
No. of pages—*46.*
No. of species—*over 100.*
No. of genera—*60.*
No of references—*393.*
Monograph II dealing with the order *Malvales,* and including the following six families: Bombacaceae, Elaeocarpaceae, Gonystylaceae, Malvaceae, Sterculiaceae, and Tiliaceae.
No. of pages—*39.*
No. of species—*over 100.*
No. of genera—*38.*
No. of references—*359.*
Monograph III dealing with the order *Scitamineae* and including the following four families: Cannaceae, Marantaceae, Musaceae, and Zingiberaceae and the order *Microspermae* including the family, Orchidaceae.
No. of pages—*32.*
No. of species—*over 120.*
No. of genera—*45.*
No. of references—*228.*
(Note: The above monographs are available at $1.00 per copy. Direct orders to The Lynn Index, Massachusetts College of Pharmacy, Longwood Avenue, Boston 15, Massachusetts.)

b. Manuscript for Monograph IV has recently been given to the printer. The data included in this issue deal with the order *Glumiflorae,* consisting of the Cyperaceae and Gramineae.
No. of genera—*87.*
No. of species—*over 180.*
No. of references—*767.*

c. Manuscripts for Monographs V and VI are well along toward completion. When printed, each of these monographs will be considerably larger than any one of those mentioned above under a. Monograph V will deal with the order *Plantaginales,* including only the Plantaginaceae, and with the order *Rubiales,* including the Caprifoliaceae, Dipsacaceae, Rubiaceae, and Valerianaceae. This issue will be concerned with approximately 110 genera and with more than 270 species and varieties. It will contain about 630 references.
Monograph VI will deal with the large order *Tubiflorae,* including the following families:

Acanthaceae
Bignoniaceae
Boraginaceae
Convolvulaceae
Gesneriaceae
Globulariaceae
Hydrophyllaceae
Labiatae
Lentibuloriaceae
Martyniaceae
Myoporaceae
Orobanchaceae
Pedaliaceae
Polemoniaceae
Scrophulariaceae
Solanaceae
Verbenaceae

Because of the extensive amount of material available it will probably be necessary to publish this monograph in at least two parts.

It appears that this monograph, when complete, will contain information dealing with at least 260 genera and with as many as 1,100 species and varieties. The number of references in the biblography of this monograph will certainly exceed 2,100.

An appreciable amount of work has also been done on nine other dicotyledonous orders including a total of forty-six families. The material of these groups will require the issuance of at least three monographs.

WORK TO BE UNDERTAKEN

In addition to completing the above-mentioned portions it is still necessary to organize and edit the voluminous material dealing with the lower groups of plants (the algae, fungi, lichens, and bryophytes). Also to be done is the work on the ferns and the fern-allies comprising at least seven families.

The material having to do with the four orders of gymnospermous plants is extensive, especially that pertaining to the conifers.

Of the flowering plants (Angiosperms), twenty-one orders including nearly 100 families of dicotyledons must be completed. Six monocotyledonous orders, made up of at least twenty-one families, remain undone at the present writing.

ASSISTANCE NEEDED

As indicated earlier in this paper, a grant from Smith Kline & French Laboratories has expired. The work done on *The Lynn Index* since June of 1957 was made possible through that grant and grants from the Massachusetts College of Pharmacy.

Now, in order for the work to continue, it is necessary to look elsewhere for financial assistance. Of course the necessary funds need not come from any one source, but unless funds are forthcoming in the future work on this project will have to come to a halt.

To state the exact amount of money that will be necessary in completing the project would not be an easy task. However, it does seem that $15,000 would enable the editors to complete much of the remaining work.

Here we have the essence of a profession—a specialized service on a high intellectual level devoted to the well-being of people.

Lloyd E. Blauch, Am. J. Pharm. Ed. 12, 246 (1948)

REPORT OF THE SECRETARY-TREASURER OF THE AACP CONFERENCE OF TEACHERS, 1958-1959

JOSEPH H. KERN

Robert's Rules of Order in defining the responsibilities of this office states that "the secretary should keep a record of the proceedings stating what was done and never make criticism, favorable or otherwise on anything said or done." Your secretary finds it difficult to report the activities of this organization without prefacing this report with facts concerning the lack of activity among the teachers of pharmacy.

The Conference of Teachers now completing its seventh year has less than 100 members who have held membership from its inception. It is impossible for this office to seek out the approximate 1000 teachers of pharmacy on a personal basis in order to increase the membership. Dues notices sent from this office in October were accompanied by an extra membership application blank for your colleagues. If the 336 individual members on the roll as of July 31, 1958, had used this application blank as suggested, our membership today could be reported as being over 600 members.

The report of the Membership Committee will reveal that individual memberships increased by only five members over the previous year. The only Section to show an increase in membership was the Section on Pharmacy which increased by four its membership over the previous year. Total Section membership decreased by eleven.

It must be a great disappointment to those who fathered and nurtured the Conference in its infancy to observe its being weighted down by the obesity of inertia. This is your organization; your officers cannot do more than you will permit them to do.

If you are opposed to having your membership expire a month or two after your payment of dues, it is possible that you have ignored the dues notices sent out from this office. Since our fiscal period and the time of our annual meeting never seem to coincide, it is possible that a change in our bylaws is in order. One year membership could be calculated from the date dues are paid. This would create a burden with respect to the bookkeeping; however, it could be worked out.

Last year your secretary tried to create a competitive spirit among the colleges to stimulate a greater interest in membership in the Conference by establishing an "Honor Roll." A college in order to be eligible to have its name placed on the "Honor Roll" has to have 100 per cent membership of its full-time faculty members in one or more of the Sections of Teachers. This year seven colleges have 100 per cent membership of all full-time faculty members. This is the same number reported last year; however, only one college is a repeater. The seven colleges on the "Honor Roll for 1959" are:

University of Arizona
University of Kansas City
University of Minnesota (2nd year)
Northeast Louisiana State College

Ohio Northern University
Oregon State College
University of Wisconsin

If the name of any other college has been omitted, your secretary will be most happy to add that name to the "Honor Roll for 1959."

It is about time the teachers of pharmacy synchronized their thinking and got off the launching pad. We cannot blast off into the twenty-first century in an eighteenth century vehicle. The only media we have to insure us of a true exchange of our ideas are the Conference of Teachers and the *American Journal of Pharmaceutical Education*. The lack of support on the part of the teachers of pharmacy is not only a deterrent to pharmaceutical education, it also curbs the initiative and creativity of the individual. It would seem in order that we reconsider subscription to the *American Journal of Pharmaceutical Education* as a prerequisite to membership in the Conference of Teachers and that we all increase our efforts to stimulate interest and membership in our organization.

The Conference of Teachers is indebted to many who have expended a great deal of time and effort to improve our organization. The officers of all five of the Sections of Teachers have been ever ready to do their part, and I personally wish to thank each one of them for the fine support they have given to this office. Although membership has increased only minutely, credit must be given to several individuals who have been instrumental in maintaining our membership and who have made other contributions. Many applications received in this office originated through Warren Weaver, James E. Dusenberry, and Floyd A. Grolle.

The Program Committee has gone to a great deal of time and expense to bring to you a speaker whose presentation could well be the highlight of this Convention. Lloyd M. Parks and Takeru Higuchi are to be commended for arranging the fine program presented here today.

The Council on Conference of Teachers for the year 1958-1959 is composed of the following:

Representative, Section on Pharmacy Administration
Stephen Wilson (1960)
Representative, Section on Biological Sciences
Frank L. Mercer (1959)
Representative, Section on Chemistry
Paul J. Jannke (1959)
Representative, Section on Pharmacy
Byrl E. Benton (1960)
Representative, Section on Graduate Instruction
Takeru Higuchi (1959)
Representative appointed by AACP
James E. Gearien (1959)

At the second session of its annual meeting held in Los Angeles, 1958, the Council elected the following officers for the year 1959:

Chairman, Takeru Higuchi, University of Wisconsin
Vice-Chairman, Byrl E. Benton, Drake University
Secretary-Treasurer, Joseph H. Kern (2nd year of 3 year term), Northeast Louisiana State College

Committees appointed by Chairman Takeru Higuchi for the year 1959 are the following:

Membership Committee
Byrl E. Benton, Chairman (Bylaws). Term Expires 1959.
Frank L. Mercer, (3rd year of 3 year term). Term expires 1959.
Tom S. Miya, (2nd year of 3 year term). Term expires 1960.
Eino Nelson, (1st year of 3 year term). Term expires 1961.

Program Committee
Joseph H. Kern, Chairman (Bylaws). Term expires 1960.
Lloyd M. Parks, (3rd year of 4 year term). Term expires 1960.
Edward E. Smissman, (1st year of 4 year term). Term expires 1962.

Resolutions Committee (All annual appointments)
August Lemberger, Chairman
Alfred Martin
Harry Kostenbauder

Auditing Committee (All annual appointments)
Pierre Smith, Chairman
Elmer Plein

Bylaws Committee (All annual oppointments)
Edward J. Rowe, Chairman
Walter Hartung
Louis King

Your attention is once again directed to Article IV, Membership, Section 1, Members, of the Bylaws, "Any active member of the Conference in good standing who reaches retirement status shall be designated as an *emeritus member* of the Conference without further payment of dues." In the last two years several names have been presented that were not eligible. This embarrassing situation arises from the fact that the individuals recommended were not active members of the Conference. Each Section should be ever ready to recognize those who have attained emeritus status; however, they should check with this office before making recommendations.

The Membership List for 1958-1959 as prepared by this office and copies of reprints of the Bylaws may be obtained at the Section meetings and at the close of this session.

The Conference of Teachers is once again indebted to the American Association of Colleges of Pharmacy Executive Committee, especially to its Chairman, Harold G. Hewitt, and Secretary, George Webster, for their willingness to help the Conference whenever called upon to do so. My personal thanks to these gentlemen for making my position an easier one.

Thanks are due Dean Ralph M. Wilson and the School of Pharmacy, Northeast Louisiana State College, for defraying expenses for printing necessitated by moving the office of secretary from Florida to Louisiana.

It has been an honor to have served you for the past two years, and in concluding the second year of a three-year term I am looking forward to the most prosperous year in the history of the Conference of Teachers. Under the very capable leadership of our Chairman, Takeru Higuchi, the Conference has enjoyed a good year and there have been improvements.

On behalf of all your officers thanks to all of you for making our tenure of office a pleasant one. There is much yet to do, and I am sure each of you recognize the role you must play in order that the Conference of Teachers attain the respect and recognition that rightly belong to it.

CONFERENCE OF TEACHERS
AMERICAN ASSOCIATION OF COLLEGES OF PHARMACY

Treasurer's Report
July 31, 1959

Section of Teachers of Pharmacy Administration

Income			
Balance Brought Forward	$167.18		
Interest Income	10.00		
Dues	91.20		
Total Income		$268.38	
Expenses			
Sectional Expenses	$ 26.10		
General Expenses	7.37		
Total Expenses		$ 33.47	
Balance in Treasury			$234.91

Section of Teachers of Biological Sciences

Income			
Balance Brought Forward	$317.69		
Interest Income	10.00		
Dues	120.00		
Total Income		$447.69	
Expenses			
General Expenses	$ 7.37		
Total Expenses		$ 7.37	
Balance in Treasury			$440.32

Section of Teachers of Chemistry

Income			
Balance Brought Forward	$320.19		
Interest Income	10.00		
Dues	138.40		
Total Income		$468.59	
Expenses			
General Expenses	$ 7.37		
Total Expenses		$ 7.37	
Balance in Treasury			$461.22

Section of Teachers of Graduate Instruction

Income			
Balance Brought Forward	$345.24		
Interest Income	10.00		
Dues	134.80		
Total Income		$490.04	

Expenses			
General Expenses	$ 7.37		
Total Expenses		$ 7.37	
Balance in Treasury			$482.67

Section of Teachers of Pharmacy

Income			
Balance Brought Forward	$469.61		
Interest Income	10.00		
Dues	189.60		
Total Income		$669.21	
Expenses			
General Expenses	$ 7.39		
Total Expenses		$ 7.39	
Balance in Treasury			$661.82

Summary

Income			
Balance Brought Forward	$1,619.91		
Interest Income	50.00		
Dues	674.00		
Total Income		$2,343.91	
Expenses			
Sectional Expense	$ 26.10		
General Expense	36.87		
Total Expense		$ 62.97	
Total Conference Treasury			$2,280.94

Balance of Sections as of July 31, 1959

Section of Teachers of Pharmacy Administration	$ 234.91	
Section of Teachers of Biological Science	440.32	
Section of Teachers of Chemistry	461.22	
Section of Teachers of Graduate Instruction	482.67	
Section of Teachers of Pharmacy	661.82	
Total Conference Treasury		$2,280.94

The total Conference Treasury of $2,280.94 is maintained as follows:

Central Bank, Monroe, Louisiana		
Checking Account	$ 654.12	
Savings Account	1,626.82	
		$2,280.94

I hereby certify the above is a true accounting of the fiscal affairs of the Conference of Teachers of the American Association of Colleges of Pharmacy for the period of August 1, 1958-July 31, 1959.

August 1, 1959

Joseph H. Kern, Secretary-Treasurer
Conference of Teachers AACP

Examined and found correct.

Pierre F. Smith
Elmer M. Plein
Auditing Committee

PRESIDENT'S SECTION

THE NEW PATTERN

The report of the Committee on Resolutions, which will appear in the Winter issue of this journal, contains one resolution of particular significance. At the meeting held in Cincinnati last August, the delegates (without discussion or dissenting voice) voted to hold a teachers' seminar covering all five areas of the pharmaceutical curriculum every three years. This means that all teachers of pharmacy will have the opportunity to meet at a general seminar every three years rather than every six years as is the current procedure.

The second part of the resolution provides that the annual business meeting of the American Association of Colleges of Pharmacy be held at the same time as the teachers' seminar each time a general seminar is scheduled. Thus, every three years the AACP will meet on the college campus serving as host to the teachers' seminar and will not meet with the American Pharmaceutical Association as has been the procedure through the years.

The recommendation resulting in the resolution adopted was contained in the address of President Zopf. The Executive Committee studied the recommendation at its meeting just prior to the meeting of association delegates. One of the problems given attention was the place of the various sections of teachers, as now contained in our Association structure, in the new plan.

As a result of these deliberations, details pertinent to the two basic provisions given above were established and presented to the various sections during the meeting. With one exception, each section approved the basic provisions and the following points by a large majority vote of members present:

1. The sections of teachers as now constituted will be continued and will meet during each of the general seminars. In addition, each section will meet during the seminar in its particular discipline.
2. During the two years between the general seminars, the various sections will not meet when the association holds its annual business session during the week the A.Ph.A. meets.

Following the Association meeting, the Executive Committee discussed the formation of the general seminar committee and agreed on a committee of ten constituted as follows:

1. Dean of the host college.
2. A staff member of the host college.
3. An educational specialist.
4. Secretary, AACP.
5. One representative from each of the Sections of Teachers of Pharmacy, Pharmaceutical Chemistry, Pharmacy Administration, Biological Sciences, and Graduate Instruction.
6. One representative from the area of pharmacognosy or pharmacology depending upon the area of the person representing the Section of Teachers of Biological Sciences.

The above covers the salient points of the new pattern. Many details remain to be worked out as the new pattern unfolds. I am sure, however, all problems which will arise can be solved with the cooperation of the officers and membership of the various sections.

With the desirability of a general seminar every three years agreed upon, the need for annual meetings of the several sections of teachers becomes less apparent. Certainly these meetings, as held with our annual business session, are not reaching as many, or the same group, of teachers as are the seminars. Many of our young teachers who can afford to attend the seminars are unable to be present at the AACP meetings as now held. Section meetings held at the time of the seminar meetings will reach many more of our teachers in the professional disciplines, and the various sections should be strengthened as a result.

What is the philosophy that brought about the new pattern for the seminars? The reason, of course, is to enable the teachers of all the professional disciplines to meet as a group more frequently than every six years. As the seminars have been conducted, teachers of a different discipline met each year, and after five years a seminar in all of the five areas was held.

Under this procedure, the enthusiasm of the staff member returning from a seminar frequently was not shared by the staff of the other disciplines. Accordingly, much of the good from the seminar was lost as many of the ideas were never put into practice. "Cross-fertilization" never really occurred to the extent possible.

Because of the change to the longer curriculum and the upgrading of the course content, which must follow if a truly improved program is to result, it is extremely important that our teachers meet as a unit more frequently, have the opportunity to share the same experiences and to generate enthusiasm as a unit. I am sure our staffs will work more as a team in the initiation of the ideas thus gained and that our programs in our schools and colleges will be improved as a consequence. This is the philosophy behind the new pattern.

I believe the program has great merit and warrants the cooperation of everyone. Since the pattern of the past called for a general seminar next year it was important that the decision for the future be made this year, not only in regard to the frequency of the general seminars but also as to the place of meeting of our Association.

We are embarking on a new experimental procedure in our attempt to improve further the programs in pharmaceutical education. Some variations in the procedure may be essential to make the experiment produce the greatest "yield," but I believe the basic concepts will stand the test and help us accomplish our objective.

Charles W. Bliven

To meet the future no preparation is more important than broad knowledge whose attainment has been begun early and steadily added to.

Henry B. Webb, Am. J. Pharm. Ed., 12, 175 (1948)

EDITORIAL

The AACP must, if it is to assume its rightful place as an organization of educators, be willing at all times to defend the rights and prerogatives of those it educates; it must also be willing either to stand behind its educational processes or to change them. For years pharmaceutical educators have deplored the weak pharmacy courses which have cropped up in the armed forces. This is as it should be. The education of a professional service representative is no less our responsibility if he is to be a consultant on drugs. The *one* curriculum which trains a man to be a specialist in drugs is pharmacy. Yet, when the resolution was presented on the floor of the AACP convention calling to the attention of manufacturers the necessity that professional service representatives be pharmaceutically trained, a dean was heard to say, "That's none of our business." Some educators expressed concern that the resolution might offend the manufacturers. The manufacturers are done an injustice if it is thought that calling this matter to their attention will offend them. They would think less of us for *not* defending our programs of education.

The Summer issue was sent to the presidents and sales directors of fifty leading pharmaceutical manufacturers with letters calling the editorial to their attention. At this writing the replies from these people are coming in. All are cordial. The following is quoted from a letter sent to me by Mr. Robert A. Hardt, President of the Armour Pharmaceutical Company:

> . . . I have had the opportunity to discuss your editorial with our marketing director and sales manager, and we have all agreed to work toward a higher percentage of pharmacists in our field staff. I am sure this will be a worthwhile objective, and as a pharmacist I am, of course, sympathetic to the objective.
>
> There are a few angles which I should like very much to discuss with you when I see you again. Perhaps as you pass through Chicago you could find time to pay us a visit since we now are so conveniently located on the edge of the Loop.

Throughout the profession there must be that condition which Judge Learned Hand has prescribed for law and society: "the mutual confidence on which all else depends can be maintained only by the open mind and a brave reliance upon free discussion." Often it appears that some college people have the misconception that if you ignore a problem long enough it will solve itself or go quietly away.

President Logan Wilson of the University of Texas once described an administrator as one who

> . . . presides at the usual meetings, appoints the customary committees, sees the necessary people, answers his daily mail, and tries to keep everybody contented by studiously avoiding the unpleasant, the untoward, and the unseemly.

This may be the way to be an administrator in an educational institution, but it is not the way to defend the principles of an educational program in a large and complex profession. Everyone will never be contented. The unpleasant must be faced and dealt with; the untoward must be reconciled; and the unseemly must be made fit. Possibly the deans are not the people for the job. Possibly what the AACP needs is a greater participation in its activities by those who are not deans. Is there a valid reason why the President of the Association must always be a dean, or why two out of every four nominees for the Executive Committee are, *by tradition*, deans? Should we be awed that

"X" professor is now dean of "Y" college? Just as there is a wide variance as to the manner in which deans are selected, so also there are wide differences of opinion as to the qualifications for such an office.

Dr. Rufus A. Lyman, former Editor of this journal, once said that what pharmaceutical education needed most was more funerals among the deans. He was a dean himself when he made that statement. What the Association needs is fewer deans available at Association convention time so that some faculty members besides deans could be the official college representatives. These people could, then, vote some non-deans into important offices and could themselves get appointed to committee chairs. In the last four years from nine to twelve of the fifteen committee chairmen have been deans.

Officers of the Association should be elected not by delegates (deans) voting for deans within minutes after nominations are made. Delegates should vote for officers and Executive Committee members *after* the qualifications of these nominees have been discussed by all members of each college faculty, in their own faculty meetings. The offices of the Association are not wholly honorary. There's work to be done in pharmaceutical education. We need to be about it. We need more young, vigorous men working in the Association *for* the Association.

The key engineer in developing Ford's new Falcon hand-picked a crack staff to do the job. He said, "They're all young fellows, and the majority of them don't know all the reasons why things can't be done. So they just go ahead and do them."

In June of 1933 that good friend of pharmacy, Dr. Edward C. Elliott, President Emeritus of Purdue, took the initial step in what proved to be an unprecedented undertaking. He announced to an astonished faculty the appointment of a committee of the younger members of the University staff which was to have unlimited authority to examine plans and policies of the University with regard to internal affairs. The committee was to be free of "supervision" by deans, department heads, and professors. It was given *carte blanche* in the consideration of criticisms, objections, and suggestions on the part of any member of the staff, and it was to report to the faculty on any aspect whatsoever of the internal administration of the University. President Elliott recognized the vitality of youth and had confidence in its discernment.

Arnold Toynbee tells a story about fishermen in the North Sea who had difficulty keeping their fish fresh. They went out trawling for many weeks at a time and invented a floating tank. They would catch their fish alive, put them into the tank, and keep them alive until they got home; but, even so, the fish were often stale because, though a fish might be alive in the tank, he was after all a prisoner and inactive. One captain of a trawler, however brought back beautiful fish. They were quite different from all the others, fresh and lively. One day he told the secret of his success. "You see," he said, "for every thousand live herring I put into my tank I put in one catfish. Now the catfish may eat one or two herring while on the way home, but he keeps the rest moving; he keeps them lively and they come back in beautiful condition."

The American Association of Colleges of Pharmacy needs some catfish in the tank; it needs young, new faces in prominent positions; it needs young men who have bright, healthy ideas; but most of all it needs young men who have the courage to face the problems of pharmaceutical education.

Melvin R. Gibson

ANNOUNCEMENTS

Pan American Seminar on Pharmaceutical Education Postponed. In accordance with the resolution adopted at the Fourth Pan-American Congress on Pharmacy and Biochemistry, the Pan-American Pharmaceutical and Biochemical Federation, through its Committee on Pharmaceutical Education, initiated plans for holding a Seminar on Pharmaceutical Education in San Juan, Puerto Rico, October 11-16, 1959.

Following the announcement of this Seminar and distribution of a promotional brochure, considerable enthusiasm from all quarters has been received. However, at a meeting of the Committee held during the 106th Convention of the American Pharmaceutical Association in Cincinnati, Ohio, August 16-21, it was noted that with less than two months until the seminar is due to convene few reservations promising assured attendance have been received, and a number of expressions concerning difficulties in attendance have been voiced.

Therefore, after careful deliberation and with a full realization of the importance of this meeting for all pharmaceutical educators throughout the Americas, it has been decided to postpone the seminar until a time nearer the Fifth Pan-American Congress on Pharmacy and Biochemistry. It is hoped that a time just preceding the Fifth Pan-American Congress on Pharmacy and Biochemistry scheduled to be held in Santiago, Chile, November 13-19, 1960, will insure better attendance at both the Seminar and the Fifth Congress.

In postponing this Seminar, the Federation wishes to express its gratitude to the officers of the Federation, member associations and their constituents, members of the Committee on Pharmaceutical Education, the local committee in Puerto Rico, representatives of the government of the Commonwealth of Puerto Rico, members of the U.S. pharmaceutical industry who have made contributions, officials of the Organization of American States, the Pan-American Sanitary Bureau, the U.S. Department of Health, Education and Welfare, the U.S. Department of State, and all of those friends of pharmacy in the Western Hemisphere for their support. We look forward to their continuing assistance to further developing this Seminar.

An announcement will be made in the near future regarding the site and date of the Seminar. (Submitted by Dr. Melvin W. Green, Director of the Seminar, and Dr. Joseph B. Burt, President of the Federation.)

Fellowships in Higher Education. The University of Michigan through its Center for the Study of Higher Education will again offer fellowships for the academic year 1960-61. They are of two types: (1) The Michigan Fellows in College Administration, five in number, devote the year to study, internships, research and other experiences that are intended to help prepare them for college and university administration. On a postdoctoral basis, or equivalent, the fellowships cover living and incidental expenses up to a maximum of $8000. (2) The graduate fellowships in higher education are for predoctoral students who need assistance in completing the degree and

who show promise of contributing to research on the problems of higher education. They vary in amounts from $1000 to $3000, depending upon need.

Applicants for either type of fellowship should be under forty years of age. Application forms and a circular descriptive of the program may be secured from the Center for the Study of Higher Education, The University of Michigan, Ann Arbor. The deadline for applications is February 1.

The program at Michigan is supported by a grant of funds from the Carnegie Corporation of New York. The Michigan Fellows in College Administration who were given awards in previous years are now in such positions as Assistant to the President, Dean of Students, Dean, and President. The institutions include junior colleges, private liberal arts colleges, and state colleges and universities.

NSF Announcement. The National Science Foundation announces a new program for support of renovation and/or construction of graduate level (doctoral) research laboratories in the natural and engineering sciences at institutions of higher education. Generally speaking, equipment to be supported will be limited to standard fixed equipment (e.g., laboratory benches, built-in refrigerators, etc.), whether the grant is for construction of a new laboratory or the renovation of an existing one.

Proposals pertaining to laboratories for research use in any area of the basic sciences will be considered. However the Foundation will not consider requests for support of facilities to be used primarily for instructional purposes.

Grants made under this program will require matching by the institution, from non-federal sources, to the extent of at least 50 per cent of the direct costs to be incurred. During fiscal year 1960 (July 1959 to June 1960), funds for this program will be severely limited in amount. Accordingly, it is expected that it will be possible to meet only the most urgent needs.

Proposals should be submitted to the National Science Foundation, Washington 25, D.C., by *December 1, 1959*. In most cases it will be helpful to address an inquiry to the appropriate Division of the Foundation before preparing the proposal. It is anticipated that grants under this program will be made about June 1, 1960.

Not only have many pharmacists failed to sense the indispensable character of their work, but they have foolishly displayed an apologetic attitude to pharmacy in general.

Harry S. Harrison, Am. J. Pharm. Ed., 10, 211 (1946)

MEMORIALS

JACK K. FINNEGAN

Members of the faculty of the Medical College of Virginia mourn the premature passing of their colleague, Jack K. Finnegan, who died after a brief illness on September 13, 1958. Dr. Finnegan was born April 23, 1916 in Denhoff, North Dakota. He received his Ph.D. degree at the University of California and came to the Medical College of Virginia in 1943 as research assistant in pharmacology. During his period with MCV he rose to the position of associate professor of pharmacology which he held at his death.

While his career was relatively short, he made valuable contributions in the fields of drug metabolism and toxicology and altogether had about fifty papers to his credit which were published in several journals. He is survived by his wife, Doris, a daughter, Kathleen, and his mother, Mrs. Florence Finnegan, of Portland, Oregon.

His memberships in professional and fraternal organizations were many, but he will be remembered by his colleagues and students as a competent specialist in his field and a genial comrade.

Warren E. Weaver

OTTO E. M. RUHMER

The death of Dr. Otto E. M. Ruhmer should remind us again that in the endless debates about the importance of the humanities in the pharmaceutical curriculum we are apt to forget the most important fact of all—the teacher.

Dr. Ruhmer taught history at the Brocklyn College of Pharmacy for twenty-one years, with such devotion to his subject and loyalty to the objectives of the institution he served that his students were subtly and unwittingly drawn to appreciate the fundamental unity of all knowledge.

Is his classroom there reigned an informality that sometimes bordered on bedlam. An unsympathetic observer or a professional "educator" would have found a lack of discipline which must thwart all real learning. Yet, look a little closer and you discover that the noise and excitement are the manifestations of a passionate acquisition of knowledge. Here are potential pharmacists dividing the world once again at the Congress of Vienna, or taking seriously (perhaps too seriously) the Egyptian religious revival under Amenhotep IV. If the "boys" became too unruly Dr. Ruhmer would unexpectedly stop them with a violent flow of words—often in his native German tongue—which sounded almost profane in its hissing gutturals and strange sonorities.

His students were aware, particularly at such moments, of his unnatural power over them; they felt more like disciples than students, and they could never quite understand it. But this pervasive influence was undoubtedly related to his compassion for his fellow man. He believed that his students would be better pharmacists if they could become better men and women. And so in his hands history became a living drama of the triumphs and tragedies of real

people, and many of his students found a new dignity in serving in their own way that society which they saw unfold in the deceptively dry history textbook.

As scholar, rather than as teacher, this compassion perhaps best expressed itself in his life-long interest in the European cooperative movements, culminating in scores of articles and in two volumes of the late thirties, both now in translation in a half-dozen languages: *History of the Origin of the German Co-operative Movement* and *The First German Consumer's Co-operatives.*

But this is no place, nor would there be sufficient space here, to consider his writings. We are concerned only with Dr. Ruhmer as teacher. For it mattered little, in his classroom, that his scholarship was internationally recognized, that he was duly listed in *Who's Who in American Education,* in the *Directory of American Scholars,* in the *Directory of the American Economics Association,* and many other scholarly compendia.

What mattered most, in the classroom, was not his stature in the academic world, but his uncanny ability to translate his scholarship into meaningful form before the typical irreverence of modern youth, to literally shock his students into an awareness of the burning presence of the historic fact.

Someone once wrote that he opened a book and found not an author but a living human being. Of Dr. Ruhmer it might be said that one entered his class expecting a teacher but found instead a man.

Chester L. Riess

ANTON HOGSTAD, JR.

Anton Hogstad, Jr., Professor of Pharmacy Administration at the University of Toledo, died in his campus apartment on November 28, 1958.

Professor Hogstad, who had been at the University of Toledo since 1947, was sixty-five years of age.

A native of Wisconsin, he was a graduate of the Philadelphia College of Pharmacy and Science, received the bachelor and master of science from South Dakota State College and continued his graduate work at the University of Minnesota.

He was a faculty member at the Philadelphia College, South Dakota State, St. Louis College of Pharmacy, Ferris Institute, and the University of Grand Rapids. From 1931 to 1937 he was special assistant to the president of Merck & Co., Inc.

He was a member of Phi Delta Chi, Gamma Alpha, Phi Lambda Upsilon, and Rho Chi. Professor Hogstad is survived by four sons.

Charles H. Larwood

. . . . . NEW LITTLE PEOPLE

Glenn Edward Anderson—born July 16, 1959, to Mr. and Mrs. LeRay J. Anderson, University of Wyoming.

Barbara Louise Green—born June 9, 1959, to Mr. and Mrs. Vernon Green, University of Texas.

Mary Ann Cosgrove—born July 24, 1959, to Dr. and Mrs. Frank P. Cosgrove, University of Texas.

Robert Graham Hudak—born July 17, 1959, to Mr. and Mrs. Edward S. Hudak, University of Pittsburgh.

Mark Richard O'Neill—born September 24, 1959, to Mr. and Mrs. Richard O'Neill, North Dakota Agricultural College.

Michael Alan Greenlick—born September 7, 1959, to Mr. and Mrs. Merwyn R. Greenlick, Wayne State University.

Elizabeth LaRocca—born February 17, 1959, to Dr. and Mrs. Joseph P. LaRocca, University of Georgia.

Cynthia Gail Braucher—born September 17, 1959, to Mr. and Mrs. Charles L. Braucher, University of Georgia.

Durward N. Entrekin, Jr.—born December 21, 1958, to Dr. and Mrs. Durward N. Entrekin, University of Georgia.

Frances Leigh Hardman—born March 22, 1959, to Mr. and Mrs. Joel Hardman, University of Georgia.

Eric Stuart Robinson—born September 5, 1959, to Mr. and Mrs. Sumner M. Robinson, Massachusetts College of Pharmacy.

Martha Marie Leary—born September 22, 1959, to Mr. and Mrs. John D. Leary, Oregon State College.

Dana Jack Gable—born September 5, 1959, to Mr. and Mrs. Fred B. Gable, Temple University.

Ilan Joseph Kreiser—born May 8, 1959, to Mr. and Mrs. Abraham Kreiser, Brooklyn College of Pharmacy.

David Wayne Banker—born May 11, 1959, to Dr. and Mrs. Gilbert Banker, Purdue University.

William Rae Ferguson—born June 10, 1959, to Dr. and Mrs. Hugh C. Ferguson, Ohio Northern University.

John William Jordin—born July 18, 1959, to Dr. and Mrs. Marcus Jordin, University of Arkansas.

MARRIAGES . . . . . .

Mr. Luther Parker, Director of the University of Texas Pharmacy Extension Service, to Miss Mary Ann Carswell, August 25, 1959.

Mr. Edward W. Smith, Instructor of Pharmacy Administration, University of North Carolina, to Miss Sue Ballentine, September 5, 1959.

Dr. Nevada Marie Huntington, Professor of Pharmacy, Idaho State College, to Mr. James Higgins, September 12, 1959.

Dr. William J. Kinnard, Assistant Professor of Pharmacology, University of Pittsburgh, to Miss Dolores Malia, July 18, 1959.

Mr. Robert A. Heiser, Instructor of Pharmacy Administration, University of Pittsburgh, to Miss Eileen Slotsky, July 19, 1959.

Dr. Mario D. Aceto, Assistant Professor of Pharmacology, University of Pittsburgh, to Miss Barbara Tomei, August 29, 1959.

Mr. Walter G. Osiecki, Assistant in Pharmacology and Allied Sciences, New England College of Pharmacy, to Miss Ann M. Zendzien, September 7, 1959.

Miss Lollie Smith, Instructor of Hospital Pharmacy, University of Georgia, to Mr. Robert Lindsey, September 12, 1959.

It is as though we in the colleges are so concerned with training the student to earn a livelihood that we neglect teaching him the things he needs to know to get the most out of living.

George E. Crossen, Am. J. Pharm. Ed., 11, 255 (1947)

STAFF CHANGES

NEW STAFF MEMBERS

University of California. Dr. Roderick D. Jones, who received his Doctor of Pharmacy degree in June, 1957, has been appointed assistant clinical professor of pharmacy.

Ferris Institute. Dr. Edward P. Winters has been appointed assistant professor of pharmacy. Dr. Winters formerly taught at the University of Illinois and at the University of Florida. He recently received his Ph.D. from the latter institution. Mr. John W. Keating has been appointed assistant professor of pharmacology. Mr. Keating was formerly a research investigator at the R. J. Strasenburgh Company and was a member of the faculty of the University of Florida where he has completed all requirements for the Ph.D. degree. Mr. Robert E. Willette has been appointed instructor of pharmaceutical chemistry. Mr. Willette is a graduate of Ferris and was a graduate assistant at the University of Minnesota where he has completed all the major requirements for the Ph.D. degree.

University of Texas. Dr. Jamie Delgade has been appointed assistant professor of pharmaceutical chemistry. Dr. Delgade recently received his Ph.D. from the University of Minnesota.

University of North Carolina. Dr. Melvin Chambers has been appointed assistant dean. Dr. Chambers was formerly professional service manager for the Wm. S. Merrell Company.

North Dakota Agricultural College. Dr. Max Heinrich has been appointed associate professor of pharmacology and chairman of the department. Dr. Heinrich was formerly on the staff of South Dakota State University.

Wayne State University. Dr. William L. Blockstein has been appointed assistant professor of pharmacy and assistant to the dean. Dr. Blockstein was formerly on the staff of the University of Pittsburgh.

University of Georgia. Dr. Adelbert Elton Wade has been appointed assistant professor of pharmacology. Dr. Wade received his Ph.D. from the University of Florida in 1959. Mr. Charles May has been appointed assistant professor of pharmacy to teach hospital pharmacy. Mr. May received his bachelor's and master's degrees from the University of Tennessee. Mr. Julian Fincher has been appointed instructor of pharmacy. Mr. Fincher received his bachelor's degree from the University of South Carolina in 1956. Mrs. Shirley B. Scarbrough has been appointed instructor of pharmacy. Mr. Reuben J. Smith has been appointed instructor of pharmacy. Mrs. Scarbrough and Mr. Smith received their bachelors' degrees from the University of Georgia in 1959. Mr. Smith was the top student scholastically in that class.

University of Kansas City. Dr. Paul M. Scott has been appointed associate professor of pharmacology. Dr. Scott was formerly on the staff of Washington State University.

University of Minnesota. Dr. Herbert T. Nagasawa, biochemist in the radioisotope research laboratories of the Minneapolis Veterans Hospital, has been appointed assistant professor of pharmaceutical chemistry in which capacity he will serve as a special lecturer and research advisor for graduate students. Dr. Edward G. Rippie has been appointed assistant professor of pharmaceutical technology. Dr. Rippie received his doctor's degree from the University of Wisconsin in 1959. Dr. Edward Ronwin, an Advanced Research Fellow of the American Heart Association, Inc., has been appointed assistant professor of pharmaceutical chemistry. Dr. Ronwin uses facilities and space in the College of Pharmacy for his research.

Oregon State College. Dr. Charles O. Wilson has been appointed dean of the School of Pharmacy. Dr. Wilson was formerly professor of pharmaceutical chemistry at the University of Texas. Mr. John Leary has been appointed assistant professor of pharmacognosy. Mr. Leary received his master's degree from Massachusetts College of Pharmacy and is completing work for the Ph.D. at the University of Connecticut.

University of Rhode Island. Dr. Paul V. Buday has been appointed assistant professor of pharmacology. Dr. Buday was formerly on the staff of Fordham University.

University of Arizona. Miss Jean Whitmore has been appointed instructor of pharmacy for one year. Miss Whitmore has the M.S. degree from the University of Florida and replaces Mr. Richard Childs who is studying for one year as a National Science Foundation Fellow.

University of Washington. Dr. Lynn Robert Brady has been appointed assistant professor of pharmacognosy. Dr. Brady received his Ph.D. from the University of Washington in 1959 and replaces Dr. F. J. Goodrich, retired. Mr. Emery Brunett has been appointed a half-time instructor of pharmaceutical chemistry for the current year. Mr. Brunett is studying for his Ph.D. degree at the institution. Mr. Donald M. Gallenberger has been appointed the pharmacist for the new Hall Health Center Pharmacy. The pharmacy will operate under the control of the College of Pharmacy and will be supervised by Dr. E. M. Plein. Mr. Gallenberger was formerly in the University Teaching Hospital Pharmacy.

Brooklyn College of Pharmacy. Dr. Francis Downing has been appointed assistant professor of history. Dr. Downing formerly has taught at Pratt Institute, New York University, Queens College, Fordham, and Brooklyn College. Mr. Joseph Friedman has been appointed instructor of English. Mr. Friedman has taught at Long Island University.

George Washington University. Dr. William S. Apple, Secretary and General Manager of the A.Ph.A., has been appointed special lecturer on pharmaceutical organizations to succeed Dr. Robert P. Fischelis.

Southwestern State College. Dr. C. Dwayne Ogzewalla has been appointed as an associate professor.

University of Toledo. Dr. Howard Carl Ansel has been appointed assistant professor of pharmacy. Dr. Ansel received his Ph.D. from the University of Florida in 1959.

University of Florida. Mr. Robert E. Notari has been appointed instructor of pharmacy. Mr. Richard J. Hampton has been appointed associate professor of pharmacy. Mr. Hampton was formerly on the staff of Washington State University.

CHANGES IN STAFF TITLES

University of California. Dr. E. Brochmann-Hanssen has been promoted from associate professor of pharmaceutical chemistry and pharmacy to professor. Dr. T. W. Schwarz has been promoted from assistant professor of pharmacy to associate professor.

University of North Carolina. Dr. Sigurdur Jonsson has been promoted from associate professor of pharmaceutical chemistry to professor. Dr. Claude Piantadosi has been promoted from assistant professor of pharmaceutical chemistry to associate professor. Dr. Earl T. Brown has been promoted from assistant professor of pharmacy to associate professor.

University of Pittsburgh. Dr. Paul J. Wurdack has been promoted from instructor of pharmacy to assistant professor.

Wayne State University. Dr. Harold E. Bailey has been promoted from associate professor of pharmacognosy to professor. Dr. Richard K. Mulvey has been promoted from assistant professor of pharmacology to associate professor.

University of Georgia. Dr. Durward N. Entrekin has been promoted from assistant professor of pharmacy to associate professor.

University of Kansas City. Mr. Lyle W. Willits has been appointed assistant dean.

University of Connecticut. Dr. Donald M. Skauen has been promoted from associate professor of pharmacy to professor.

Massachusetts College of Pharmacy. Dr. Howard J. Jenkins has been promoted from assistant professor of pharmacology to associate professor. Dr. Douglas H. Kay has been promoted from instructor of chemistry to assistant professor. Dr. Edward F. LaSala has been promoted from instructor of chemistry to assistant professor.

Temple University. Dr. Charles F. Peterson has been appointed chairman of the pharmacy department.

Florida A. and M. University. Mr. Murphy D. Jenkins has been appointed acting dean of the School of Pharmacy. Mr. Jenkins replaces Mr. Matthew T. Waters who resigned as acting dean to enter retail pharmacy in New Jersey.

Southwestern State College. Dr. Walter L. Dickison has been promoted from associate professor to professor.

University of Florida. Dr. Lea G. Gramling has been named head of the department of pharmaceutical chemistry.

University of Wisconsin. Dr. S. Morris Kupchan has been promoted from assistant professor of pharmaceutical chemistry to associate professor. Dr. Dale E. Wurster has been promoted from associate professor of pharmacy to professor. Mr. Richard Strommen has been promoted from instructor to assistant professor.

GENERAL NEWS

Wilson dean at Oregon State. Dr. C. O. Wilson, Professor of Pharmaceutical Chemistry, University of Texas, has been appointed dean of the School of Pharmacy, Oregon State College. He succeeds the late Dr. George E. Crossen.

Saski at California. Dr. Witold Saski, on leave from the University of Nebraska from September 1, 1959 to February 1, 1960, has been appointed visiting associate professor of pharmacy (to pursue scholarly interests) at the University of California School of Pharmacy.

Jabbar at California. Dr. Abdul Jabbar, recipient of a Smith-Mundt Research Scholarship and a Fulbright Travel Grant, has been appointed a visiting associate professor of pharmacy at the University of California for the period October, 1959 to July, 1960. Dr. Jabbar, Senior Lecturer in Biochemistry, Dacca University, East Pakistan, will be associated with Dr. Einar Brochmann-Hanssen and will be engaged in plant chemical studies on the isolation, estimation, and biosynthesis of alkaloids.

Riegelman wins Ebert Prize. Dr. Sidney Riegelman, Associate Professor of Pharmacy and Pharmaceutical Chemistry, University of California, has been awarded the Ebert Prize. The Prize was given for three papers on drug absorption. The study clarified the importance of the various properties involved in the formulation of rectal medication. Honorable mention was given to Dr. Wilfred Crowell, formerly a graduate student in pharmaceutical chemistry at California and now a member of the pharmacy faculty of the University of Southern California.

Eiler recovers. Dr. J. J. Eiler, Professor of Biochemistry and Pharmaceutical Chemistry, University of California, who was involved in a serious automobile accident during the summer, has resumed his teaching duties.

Kumler back from Oxford. Dr. W. D. Kumler, Professor of Chemistry and Pharmaceutical Chemistry, University of California, has returned from a sabbatical leave during the last academic year at Oxford University. Dr. Kumler visited a number of schools of pharmacy both in Great Britain and on the continent.

Higuchi at California. Dr. Takeru Higuchi, Professor of Pharmaceutical Chemistry, University of Wisconsin, gave a seminar at the University of California July 6, 1959, on "A New Approach to the Study of Structure-Activity Relationships."

Graduate students at California. Twenty-seven students are undertaking graduate work in pharmaceutical chemistry during the fall semester at the University of California.

Kidder promoted. Colonel James H. Kidder, MC, USAR, has been promoted to Brigadier General. General Kidder has served as Special Assistant for Reserve Affairs to the Army Surgeon General since July, 1955. General Kidder is a consulting surgeon at City Hospital, New York, and at the St. Barnabas Hospital, New York, Attending Surgeon at French Hospital, New York, and Professor of Clinical Surgery at New York Medical College. General Kidder was dean of the Fordham University College of Pharmacy from 1932 to 1955.

Ferris receives grant. The Upjohn Company has awarded Ferris Institute Division of Pharmacy a research grant of $3,000 to support Dr. Norris W. Dunham in his investigations of the pharmacological properties of certain plants.

Neville retires. Professor W. R. Neville has retired from teaching duties at the University of Texas.

Texas conference. A unique conference was held on the campus of the University of Texas on July 5-7 to which counselors and student advisors from various senior and junior colleges in the state were invited. The purpose of the conference was to acquaint these advisors with the five year pharmacy program and their responsibilities in the preliminary education of prospective pharmacy students. Representatives of about thirty colleges attended this first conference. Representatives from the retail pharmacy, wholesale pharmacy, pharmaceutical sales, chain stores, and various areas of pharmaceutical education addressed the conference and participated in discussions.

Gjerstad in Canada. Dr. Gunnar Gjerstad, University of Texas, attended the International Botanical Congress in Montreal, Canada the latter part of August.

Alumni honor Gidley. The University of Texas Pharmacy Alumni Association presented a bronze mortar and pestle to former dean and Professor Emeritus W. F. Gidley, and the organization has voted to sponsor an "appreciation fund" in his honor to be used for research scholarships and for library books.

Texas enrollment up. Enrollment at the University of Texas College of Pharmacy

is 630 for the current academic year. This figure is about 100 larger than that for the fall semester, 1958.

Michigan to six year program. The Board of Regents of the University of Michigan recently approved a new six year program for the College of Pharmacy beginning in September 1960. The Doctor of Pharmacy program will be offered in addition to the regular Bachelor of Science course.

Michigan research building. Construction of the new four-story pharmacy research building was begun in August on the University of Michigan campus. The building which will cost in excess of one million dollars will be completed and occupied in the fall of 1960.

Blicke honored. Dr. Frederick F. Blicke, Professor of Pharmaceutical Chemistry, University of Michigan, served as honorary chairman of the Medicinal Chemistry Section of the ACS at the September meeting in Atlantic City. Dr. Blicke was honored for his outstanding contributions in pharmaceutical chemistry.

Berman returns. Dr. Alex Berman, University of Michigan, has returned from one year of study in Europe as a Guggenheim Fellow. His research was on a comparative study of hospital pharmacy in France and in the United States.

Michigan freshmen. For the first time in the history of the University of Michigan College of Pharmacy, girls outnumber the boys in the freshman class.

Arizona grant. Dr. Albert L. Picchioni, Professor of Pharmacology, Dr. Lincoln Chin, Assistant Professor of Pharmacology, University of Arizona; and Dr. Carl Breitner, Phoenix psychiatrist and consultant in psychiatry at Arizona State Hospital in Phoenix have received a grant of $13,052 from the U.S. Public Health Service to carry out a program of research concerning neurohormone levels in the brain.

Piantadosi receives grant. Dr. Claude Piantadosi, Associate Professor of Pharmaceutical Chemistry, University of North Carolina, has received a two-year NSF research grant for $14,000 for basic studies on the chemistry and metabolism of acetal phosphatides.

Idaho State receives grant. The Idaho State College of Pharmacy has received a $2,500 grant from the Smith Kline & French Foundation for purchase of a Lloyd Extractor and other research equipment for the pharmacognosy research facilities being developed with the assistance of the National Institutes of Health.

Pittsburgh receives grant. The University of Pittsburgh Department of Pharmacology has received a $1,150 grant from Ciba, Inc. to investigate the mechanism of action of guanethidine.

Ohio State grants. Ohio State University is the recipient of $61,447 in research grants for the current year. The Ohio State University Development Fund awarded the College $3,000 for research equipment in addition to the following grants to faculty members: Dr. Earl Guth was granted $2,900 towards a study of podophyllum; Dr. David Guttman was awarded $1,200 toward research on the rate of decomposition of adrenocorticosteroids; Dr. Rupert Salisbury received $300 for a study of the acute oral toxicity of silica gel; Dr. Arthur Tye and John Nelson were granted $3,200 to support a study of mechanisms of drug absorption. The Smith Kline & French Foundation gave $6,000 to the College for the purchase of research equipment. The National Institutes of Health gave the following grants: A grant of $2,000 to Dr. Jules LaPidus for a study of intramolecular enamine condensations; Drs. John Nelson and Arthur Tye received a grant of $5,800 for a study of the site of action of chlorpromazine; Drs. Jack L. Beal and Arthur Tye received $15,935 towards the continuation of a study of *Ornithogalum umbellatum* and $21,112 for a continuation of a phytochemical search for medicinal constituents.

PD fellowship at Ohio State. Parke, Davis and Company has established a fellowship under the supervision of Dr. David Guttman. Robert M. Baldwin, a graduate of the University of Toledo College of Pharmacy, has been chosen the recipient. His work will be on the study of the kinetics of steroid degradation.

New building for Wayne State. Detailed plans for the new Shapero Hall of Pharmacy to be erected on the Wayne State University campus were unveiled at a testimonial dinner September 16 in New York City for Nate S. Shapero, Chairman of the Board of Cunningham Drug Stores. Mr. Shapero, observing his fiftieth year in retail pharmacy, was honored by more than five hundred friends and associates. President Clarence B. Hilberry and Dean Stephen Wilson of Wayne attended the dinner. A sponsor committee, headed by Harry J. Loynd, Pesident of Parke, Davis and Company, and Ches B. Larsen, President of Cunningham's, has pledged to raise $500,000 of the estimated $1,250,000 needed for the Shapero Hall of Pharmacy to house the WSU College of Pharmacy. A group of thirty-four sponsors are serving as a committee to conduct the nationwide campaign for contributions. The Michigan State Legislature will be asked in the next session to appropriate the remaining money for the new building. The new building will contain approximately 60,000 square feet of floor area, will be of reinforced concrete construction. It will have model laboratories, classrooms, study lounges, faculty offices, and a lecture room.

Mr. Shapero was presented with a Wayne State Distinguished Service Award by President Hilberry at the dinner. Mr. Shapero obtained his pharmacy degree from Ferris Institute.

Wilson nominated. Dr. Stephen Wilson, Dean of the Wayne State University College of Pharmacy, was nominated for President of the A.Ph.A.

Fiske dies. Mr. Adam H. Fiske, Trustee of Philadelphia College of Pharmacy and Science and retired Vice President of Eli Lilly and Company, died in California August 25.

PCP builds. Contracts have been awarded for the construction of a wing to the pharmacology department at Philadelphia College of Pharmacy and Science. The wing will provide undergraduate laboratory space for seniors in pharmacy. It wil be known as the C. Mahlon Kline Laboratory, and will be constructed at a cost of more than $250,000, equipped.

Wilson completes book. Dean Emeritus R. C. Wilson, University of Georgia, has completed his book *Drugs and Pharmacy in the Life of Georgia* to be available in November from the University of Georgia Press.

Hartman appointed. Dr. Charles W. Hartman, University of Georgia, has been appointed to a poison control advisory committee to work with the Accident Prevention Unit of the State of Georgia Department of Public Health.

Hamor at Minnesota. Dr. Glenn H. Hamor, University of Southern California, is spending the year as a research fellow at the University of Minnesota while on sabbatical leave.

Minnesota acquires space. The University of Minnesota College of Pharmacy has acquired 1400 square feet of greenhouse space and additional outside garden facilities for medicinal plants on the St. Paul Campus. The existing facilities adjacent to the College on the Minneapolis campus have been retained.

Minnesota scholarships. Thirty-two undergraduate scholarships representing a value of $7,700 were awarded for the school year to undergraduate students in the University of Minnesota College of Pharmacy. This is an increase of eleven scholarships over the previous year. The funds have been derived from private bequests, industrial grants, and the state association.

Smissman elected. Dr. Edward E. Smissman, University of Wisconsin, was elected chairman of the Division of Medicinal Chemistry of the American Chemical Society at its recent meeting in Atlantic City.

Mrs. Strieby retires. Irene M. Strieby, who has served as Chief Librarian at Eli Lilly and Company for twenty-two years, retired September 30.

Ellis dies. Dr. Leon Clifton Ellis, President-Emeritus and Trustee of the Massachusetts College of Pharmacy, died June 19. Dr. Ellis was graduated from MCP in 1896.

MCP summer research. Over thirty faculty members and graduate students, working singly and in groups, were engaged in varied programs of research at Massachusetts College of Pharmacy sponsored by the College, Abbott Laboratories, The American Foundation for Pharmaceutical Education, John H. Breck, Inc.; Lakeside Laboratories; Nordson Pharmaceutical Laboratories, Inc.; E. L. Patch Company; S. B. Penick Company; A. H. Robins Company, Inc.; Smith Kline & French Laboratories; Sterling-Winthrop; and the United States Army Research and Development Command.

Newton honored. Dean Howard C. Newton, Massachusetts College of Pharmacy, was honored on the occasion of assuming the office of President of the American Pharmaceutical Association at a Massachusetts College of Pharmacy luncheon held August 20 during the Cincinnati convention. Seventy alumni and friends of the College attended. Mr. Leonard F. Tibbetts, College Trustee, presented a commemorative plate to the new president.

Rhode Island grants. Dean Heber W. Youngken, Jr., University of Rhode Island, has received a Public Health Service grant of $23,000 for the study of drugs from fungi for mental illness and a second PHS grant of $8,500 for the investigation of active constituents in drug plants. Dr. John J. DeFeo of Rhode Island has received a grant of $2,800 from the PHS to study high blood pressure.

Burckhalter resigns. Dr. Joseph H. Burckhalter, Head of the University of Kansas Department of Pharmaceutical Chemistry, has resigned to accept a similar post at the University of Michigan in September, 1960.

Philadelphia Pharmacy Forum. Dean Joseph B. Sprowls of Temple University and Associate Dean Linwood F. Tice of the Philadelphia College of Pharmacy and Science have been appointed as co-chairmen of the Philadelphia Pharmacy Forum which is being sponsored by the Philadelphia Branch of the A.Ph.A. Program Director for the event is Fred B. Gable, Assistant to the Dean at Temple. The program will be concerned with drug distribution policies of various community health associations.

Cole receives grant. Dr. Jack Cole, University of Arizona, received a Public Health Service Grant of $2,000 for research in the chromatography of saponins and an unrestricted grant of $3,000 from the Smith Kline & French Laboratories.

University of Washington grants. Dr. Walter C. McCarthy has been awarded a $19,000 grant from the Army for research in the field of antiradiation chemicals. Smith Kline & French Laboratories has awarded $1,500 to Dr. Alain Huitric for research in organic synthesis and stereochemistry. The Upjohn Company renewed its industrial grant to the College of Pharmacy for the current year. Western Drug Supply renewed its grant to Dr. L. Wait Rising for his pharmacy manpower studies.

Scott resigns. Dr. Paul M. Scott resigned September 1 from his position as assistant professor of pharmacology at Washington State University to assume the position of associate professor of pharmacology at the University of Kansas City.

Cheney elected. Dr. Ralph W. Cheney, Professor of Biology, Brooklyn College of Pharmacy, was elected Trustee and Treasurer of the American Institute of the City of New York.

Silverman receives grant. Dr. Harold I. Silverman, Assistant Professor of Pharmacy, Brooklyn College of Pharmacy, has received a grant from the Baker Castor Oil Company to investigate castor oil and its derivatives to find new pharmaceutical applications.

Kokoski project. Dr. Charles J. Kokoski, Assistant Professor of Pharmacy, The George Washington University, formulated and compounded the drugs used for an investigation conducted by the Drug and Device Branch, Bureau of Medicine, Food and Drug Administration, at the request of the Post Office Department. The results of the investigational study were published under the title, "Comparative Effectiveness of Phenylpropanolamine and Dextro-Amphetamine on Weight Reduction," in the July 27, 1959 issue of the JAMA.

Leonard prescription studies. Dr. Robert M. Leonard, Assistant Dean, George Washington University School of Pharmacy, has completed a preliminary study of the labels of over 20,000 prescription and over-the-counter drug products as a project for the National Drug Trade Conference. The products were examined on the shelves of the Henry B. Gilpin Company among an estimated 28,000 to 30,000 items stocked of that type in their Washington wholesale drug warehouse. A basic list of more than 1,500 single drugs was compiled from the ingredients of single and compounded drug products. Label warning or cautionary statements were compiled, categorized, and indexed with the trade names of products representing the basic ingredient list. The results of the project were discussed by the Executive Committee of the National Drug Trade Conference at its September meeting.

Heydom resigns. Mr. Curtis Heydom, Assistant Professor of Biology, St. John's University, has resigned to take a position with Burroughs Wellcome & Company.

Swartz to Purdue. Dr. Howard A. Swartz, who was a Purdue Research Foundation Fellow majoring in pharmaceutical chemistry at Purdue University, after completing his doctorate program accepted a position as assistant professor of biochemistry and physiology at Butler University.

Goodeve to North Carolina. Dr. Allan M. Goodeve, a Fellow of the Purdue Research Foundation, completed requirements for the Ph.D. degree and has accepted a position as assistant professor of pharmacognosy at the University of North Carolina.

Belcastro travels. Dr. P. F. Belcastro, Purdue University, represented the A.Ph.A., the American Institute of the History of Pharmacy, and Purdue University at the International Congress of the History of Pharmacy in Dubrovnik, Yugoslavia from August 26 to 31. The International Academy of the History of Pharmacy organized and sponsored the Congress.

A paper entitled, "The American Development of Graduate Education and Academic Research in the Pharmaceutical Sciences," was presented by Dr. Belcastro to the Section on the History of Pharmacy and Chemistry of the IX International Congress on the History of Science in Barcelona-Madrid, Spain early in September. The United States had the largest delegation to this Congress.

Florida building. Bids have been opened for the construction of a new University of Florida College of Pharmacy Building as a wing of the Medical Sciences Building. Cost will be about one and a half million dollars. An additional half million dollars from the National Institutes of Health will be spent for a research wing which will be shared with the College of Medicine.

AFPE grants. The American Foundation for Pharmaceutical Education has just distributed Fellowship grants to twenty-nine universities to provide awards to seventy-two graduate students selected by the Board of Grants of the Foundation. These awards to outstanding scholars majoring in pharmacy and closely related fields amount to $130,000. One hundred and seventy-one Foundation supported Fellows are now teaching in pharmacy colleges and one hundred and thirty-five others are now engaged in scientific and professional work in the drug industry, federal government, and in university and hospital research programs.

The AFPE also recently provided $22,000 in undergraduate scholarship funds to fifty-six colleges of pharmacy for outstanding junior and senior students. Over

1,800 practicing pharmacists received these scholarship awards during their college years.

ACA fellows. Among the sixteen persons elected as Fellows of the American College of Apothecaries at the recent meeting of the ACA Board of Directors were two college people, Dr. Walter Singer, University of California, and Mr. Richard S. Strommen, University of Wisconsin.

Postdoctoral fellows at Wisconsin. Dr. S. Morris Kupchan, University of Wisconsin, has nine postdoctoral fellows working with him during 1959-60 on various problems in pharmaceutical chemistry. Stipends for these fellows come from research grants from the National Heart Institute, the National Cancer Institute, and several pharmaceutical companies.

Correction. In the Authors in this Issue section of the Summer, 1959 issue of this journal, Professor Harold Nelson was listed as an assistant professor of business administration at Arkansas State College which was his title at the time the manuscript was submitted. Professor Nelson wishes to make known that he resigned from Arkansas State College as an associate professor of business administration effective in June, 1959 and is currently an associate professor of business at Indiana State Teachers College at Terre Haute.

Institute publications. The Institute of Higher Education of Teachers College, Columbia University has announced the publication of a series of monographs dealing with the relation between liberal arts and professional instruction in eight undergraduate professional schools. These publications will be issued at the rate of about one per month. Two are now available; the titles are *Are the Liberal Arts Colleges Becoming Professional Schools?* and *The Liberal Arts as Viewed by Faculty Members in Professional Schools.* Further information regarding these monographs may be obtained by referring to their listings in the New Book section of this issue of the *Journal.*

Train at Wisconsin. Dr. David Train, University of London School of Pharmacy, has been visiting lecturer during the summer session at the University of Wisconsin School of Pharmacy.

Maloney appointed. Mr. Edward F. Maloney has been appointed Business Manager of Columbia University College of Pharmacy. This is a newly created position. Mr. Maloney has been previously employed by the chemical divisions of National Dairy Products Corporation; E. I. DuPont de Nemours & Co., Inc., Finishes Division; and Iddings Paint Company, Inc.

Fellowships at Michigan. Two fellowship grants to the University of Michigan were announced recently. Miles Laboratories has made a grant of $2,500 for a fellowship in pharmacy and the Upjohn Company has given $2,400 for a fellowship in pharmaceutical chemistry with the fellowship to be under the direction of Dr. F. F. Blicke.

Cosmides resigns. Dr. George Cosmides of the University of Rhode Island has resigned to become a pharmacologist with the Psychopharmacology Service Center, National Institute of Mental Health.

Krezanoski resigns. Dr. Joseph Z. Krezanoski has resigned from the staff of the Medical College of Virginia to join the Barnes-Hind Laboratories.

Andrako and Smith receive grants. Dr. J. Andrako and Dr. J. D. Smith, Medical College of Virginia, have received a grant from the National Institutes of Health for the preparation of "Acylaminomalonic Esters and Derived Modifications."

Beamer to South Carolina. Dr. Robert L. Beamer received his Ph.D. from the Medical College of Virginia and has accepted a position in the School of Pharmacy, University of South Carolina.

Richard receives grant. Dr. Alfred Richard, Medical College of Virginia, has received a grant from the National Science Foundation for the purchase of a Spinco ultracentrifuge and for studies in the molecular weight determination of proteins.

Coviello to Illinois. Dr. D. A. Coviello, who received his Ph.D. degree from the Medical College of Virginia in 1958 and has been working with Dr. J. C. Krantz at the University of Maryland, has accepted a position in the College of Pharmacy of the University of Illinois.

Degrees conferred. Dr. H. G. Hewitt, Chairman of the AACP Executive Committee, recently released total figures of degrees conferred by all schools and colleges of phamacy in the United States for the academic year 1958-59. The figures do not include graduates of the University of Puerto Rico which were not available at the time of the release of the announcement.

	B.S.	Pharm.D.	M.S.	Ph.D.	Honorary	Total
Men	3,184	106	110	78	9	3,487
Women	391	5	8	—	—	404
Total	3,575	111	118	78	9	3,891

As compared to the previous year, these totals represent fourteen fewer B.S. degrees, two fewer M.S. degrees, five fewer honorary degrees, and an increase of thirty-three Ph.D. degrees.

Gonzales receives award. Mr. Edward Gonzales, who was graduated from the University of Texas in June, won the Kilmer Prize for work during his senior year on the effect of gibberellic acid on the spearmint plant. Dr. Gunnar Gjerstad directed his research.

Columbia receives grant. Charles Pfizer and Company has granted $2,000 to the Columbia University College of Pharmacy to be used for fellowships for graduate students for the academic year 1959-60. The work to be done under the grant will be concerned with the study of the technology of compression coating and will be directed by Professor Joseph L. Kanig, Associate Professor of Pharmacy.

Dusenberry receives grant. Dr. James E. Dusenberry, University of Arkansas, has received a $31,000 grant from the National Institutes of Health for research on ergot.

Williams changes campuses. Dr. Franklin S. Williams, formerly Associate Professor of Pharmacy Administration, University of Arkansas, has resigned his position to accept a professorship in business administration on the Fayetteville campus of the University of Arkansas.

Rho Chi Convention. Beta Gamma Chapter, Columbia University, College of Pharmacy was the recipient of the national Rho Chi Chapter Award at the Thirty-fifth Annual Convention of the Rho Chi Society at Cincinnati on August 19. The Award consisted of a cash prize of $250. Beta Gamma Chapter in the opinion of the Award Committee made the most substantial contribution to the encouragement of qualified undergraduate students to enter graduate education in the pharmaceutical sciences. Dean E. E. Leuallen accepted the Award in behalf of Beta Gamma Chapter and presented the winning report to the Convention. The Committee judging the chapter entries consisted of Dr. Milton L. Neuroth, College of Pharmacy, Medical College of Virginia, Chairman; Dean George L. Webster, College of Pharmacy, University of Illinois; and Dr. W. Lewis Nobles, School of Pharmacy, University of Mississippi.

At the close of the convention, Dr. Louis W. Busse, Associate Dean, School of Pharmacy, University of Wisconsin, was installed as national Vice President, and Dr. Edward J. Rowe, College of Pharmacy, Butler University, was installed for a second term as national Secretary-Treasurer. Dr. R. Bachman, College of Pharmacy, University of Arkansas, and Dr. C. Boyd Granberg, College of Pharmacy, Drake University, were installed as new Council members. The officers installed will each serve two-year terms.

Other officers serving the Society are Dean E. A. Brecht, School of Pharmacy, University of North Carolina, President; Dean Roy A. Bowers, College of Pharmacy, Rutgers University, and Dean George P. Hager, College of Pharmacy, University of Minnesota, Council members.

Fifty-three chapters of the Society were represented at the Convention.

PCP TV. Members of the faculty of the Philadelphia College of Pharmacy and Science will offer an entirely new series of television broadcasts in conjunction with the University of the Air, WFIL-TV, Channel 6, Philadelphia, starting September 30. Broadcast each Wednesday from 11:35 a.m. to noon, the general theme will be "You and Your Health." Registrar John E. Kramer will be host for the series, and the complete program is as follows:

Date	Speaker	Title
Sept. 30	Dr. Linwood F. Tice	An Oral Vaccine for Poliomyelitis
Oct. 7	Dr. Louis Gershenfeld	Air Pollution
Oct. 14	Dr. Grafton D. Chase	How Fast Are You Living?
Oct. 21	Prof. Charles E. Welch, Jr.	Living a Full Life
Oct. 28	Prof. Robert E. Abrams	One Out of Five Thousand
Nov. 4	Dr. Robert N. Jones	The Sun and Your Health
Nov. 11	Prof. Francis M. White	Your Ears and Your Health
Nov. 18	Dr. Bernard Witlin	The Household Pet—Friend or Enemy?
Nov. 25	Drs. Joseph W. E. Harrisson and Elias W. Packman	Food Additives
Dec. 2	Dr. Ivor Griffith	Drugs of Tomorrow
Dec. 9	Dr. G. Victor Rossi	The Chemisty of Mental Illness
Dec. 16	Dr. Martin Barr	Dry Skin
Jan. 6	Dr. Arthur Osol	The USP—Guardian of Your Health
Jan. 13	Dr. Elias W. Packman	Cancer Research From Animals to Man
Jan. 20	Dr. Kenneth E. Avis	Testing of Medicines for Injection
Jan. 27	Dr. Alfonso R. Gennaro	Honey as a Medicinal

Each lecture will be taped and rebroadcast over the same station one week later at 6:50 a.m., and at other times through television broadcasting stations in Binghampton, N. Y., New Haven, Conn., Lebanon, Pa., and Altoona, Pa.

VA internships. New training opportunities in hospital pharmacy will be offered by Veterans Administration hospitals across the nation during the fiscal year beginning July 1, the agency announced today. Vernon O. Trygstad, director of pharmacy service for the VA in Washington, D.C., said a new program of pharmacy internships will be opened at the Manhattan, N. Y., Hines, Ill., and Oakland, Calif., VA hospitals. The VA also will continue its program of hospital pharmacy residencies, he said. The one-year internships will allow recent pharmacy graduates of recognized schools to receive specialized training in hospital pharmacy and at the same time gain the experience required for state board of pharmacy licensure.

Interns will be appointed to the VA hospital staffs at the GS-5 and GS-6 levels ($4,040 to $5,390 per year).

Pharmacy residencies will be offered by the Oakland, Calif., VA hospital for the first time this fall, in cooperation with the University of California and other hospitals in the area. After completion of a year of graduate work at the university, residents will rotate from hospital to hospital for a year of training. Residencies also will be offered by seven VA hospitals that have conducted such training in the past. These are the hospitals at Los Angeles, in cooperation with the University of Southern California; St. Louis, in cooperation with the St. Louis College of Pharmacy and Science; Iowa City, in cooperation with the University of Iowa. Also the VA hospitals at Indianapolis, in cooperation with Butler University; Pittsburgh (GM&S hospital), in cooperation with the University of Pittsburgh; Hines, Illinois, in cooperation with the University of Illinois; and Fargo, North Dakota, in cooperation with the North Dakota Agricultural College and other hospitals.

With the exception of the program at the Fargo hospital, these are twenty two-month residencies in which the student spends about twenty-eight hours per week at the VA hospital during the time he is working toward his master's degree at the cooperating university. The training at the Fargo hospital is a rotating residency program similar to that to be established at the Oakland, California, VA hospital.

All the residencies and internships meet standards of the American Society of Hospital Pharmacists. Residents must be registered pharmacists accepted by the cooperating university for graduate work. Application for the residencies and internships should be made directly to the VA hospitals conducting the training.

1959 Meeting of the Plant Science Seminar. The University of Illinois College of Pharmacy was host to the Thirty-Sixth Annual Plant Science Seminar from August 7 through 10. The local committee included the following: Frank A. Crane, Chairman, Stanislaus J. Smolenski, Ralph F. Voigt, George L. Webster; Women's Activities—Verle M. Crane, Ethel V. Voigt, Anna Bee Webster.

The Seminarians were welcomed by Dr. George L. Webster, Dean of the College of Pharmacy at the University of Illinois.

The Plant Science Seminar activities included a field trip to the University of Illinois Drug and Horticultural Experiment Station and to the Chicago Museum of Natural History. Papers dealing with research and teaching in pharmacognosy were presented at the Teachers Seminar in Pharmacognosy which was held August 9 through 13 at the University of Illinois College of Pharmacy.

The Edwin Leigh Newcomb awards were presented by Dr. Heber W. Youngken, Sr., at the annual banquet. The undergraduate award was given to Mr. Robert E. Brummett of Oregon State College of Pharmacy, the graduate award to Dr. Ikram Hassan of the Philadelphia College of Pharmacy, and the Teacher-researcher award to Dr. Virginia L. Bailey of Wayne State University College of Pharmacy.

The banquet address was given by Mohammed Samir Amer who spoke on "The Practice of Pharmacy in Egypt."

By unanimous approval of members at the business meeting of the Plant Science Seminar, a Constitution and Bylaws was adopted forming an organization to be known as The American Society of Pharmacognosy.

This Society has been formed by the pharmacognosists of the United States to formalize and perpetuate the standards and ideals of the Plant Science Seminar and has for its purpose " . . . to promote the growth and development of pharmacognosy, to provide the opportunity for association among the workers in that science and in related sciences, to provide opportunities for presentations of research achievements, and to promote the publication of meritorious research." Membership is also open to graduate students and workers of other nations.

The following officers of the Seminar are to serve as officers of The American Society of Pharmacognosy until the first election of the Society: Chairman, Edson F. Woodward; First Vice-Chairman, Mary L. Anderson; Second Vice-Chairman, Frank J. Pokorny; Secretary-Treasurer, Frank L. Mercer. The Executive Committee is: J. Hampton Hoch, Carl Johnson, Frank L. Mercer, Arthur Schwarting, and Edson Woodward.

BOOK REVIEWS

Accreditation in Higher Education, Lloyd E. Blauch, Editor. U.S. Department of Health, Education, and Welfare, Office of Education, U.S. Government Printing Office, Washington 25, D.C., 1959. vii+247 pp., 5 tbls., 4 appendixes. $2.50 (cloth), $1.50 (paper).

Accreditation in Higher Education, the preparation of which is the work of forty persons, is presented in three main parts: Part I, "Nature and Evolution of Accreditation"; Part II, "Accreditation by State and Regional Agencies," and Part III, "Accreditation of Education for the Professions." The foreword is written by the Commissioner of Education and the preface by the Assistant Commissioner for Higher Education, Lloyd E. Blauch. The purpose of the new book is "to satisfy the urgent need for a modern reference source on accreditation . . . "

Part I is composed of four chapters: Meaning of Accreditation, Evolution of Accreditation, The U.S. Office of Education and Accreditation, and The National Commission of Accrediting. This section provides historical and background material necessary to understand the accreditation movement in the United States. Accreditation is defined, its purposes are set forth, types of accrediting organizations are discussed, and brief mention is made of the influence accreditation programs have had on higher education. The discussion of the U.S. Office of Education makes it clear that the Office serves as an advisory, consultative, and fact-finding agency for all education, and that it has no accrediting function as is often assumed. Part I is concluded with a brief discussion of the National Commission on Accrediting, an agency which together with regional associations counteracts the tendency of "higher education to be fragmentized and divided by pressures of specialized groups or organizations."

Part II is introduced by a discussion of accreditation in the States, including state departments of education, state universities and other state agencies engaged in accrediting and related activities. This is followed by a description of the individual regional accrediting agencies (New England, North Central, Northwest, Southern and Western) which includes the historical background, the purposes, and the policies of each.

Part III presents individual chapters devoted to accreditation of education for the professions. In all, twenty-eight professional accrediting programs are discussed. Chapter 31, Pharmaceutical Education, is written by Melvin W. Green, Director of Educational Relations, American Council on Pharmaceutical Education. Dr. Green discusses briefly the development of accreditation in pharmaceutical education from an historical standpoint and in greater detail the program of the ACPE.

The appendixes provide tabulated summaries of facts about accreditation.

Accreditation in Higher Education provides a wealth of information in a field in which the average educator in the professions is rather poorly informed. Accreditation procedures and policies are usually the concern of deans and administrative officers, whereas the average teacher in the professions demonstrates only a passive interest in and possesses little knowledge of the machinery whereby standards in higher education are maintained. This new publication makes available resource material that is both interesting and valuable to those engaged in higher education. The book is well organized, well edited, well documented and even with three major divisions of subject matter, the reader is continually aware of the underlying theme, accreditation. Part III makes it possible for the reader to make comparisons with accrediting procedures in related as well as in unrelated fields. For example, the procedures of accreditation for pharmacy can be compared with those of medicine, dentistry, nursing, osteopathy, podiatry, public health, and veterinary medicine. The reviewer believes that every pharmacy library should have the book on file. In graduate programs that provide some teacher training for those who are preparing for careers in pharmaceutical education, *Accreditation in Higher Education* provides a potentially useful reference. Although the book is actually a specialized reference publication, pharmaceutical educators, irrespective of field of specialization, should find it of sufficient value to warrant its inclusion in their personal collections.

Donald C. Brodie
University of California

The Book of pH, R. B. Webber. George Newnes Limited, London, England (The Macmillan Company, New York 11, U.S. agents), 1958. 111 pp., 40 figs., incl. 6 color plates, 9 tbls. $6.00.

The author has divided his subject into seven sections, six appendices, a glossary, and an alphabetical list of about fifty chemical substances. The first section presents the simple concept of a scale of acidity and alkalinity with a full-page color plate and less than three pages of text. The text material consists of a series of correct elementary statements. As an example of the style, it is interesting to point out one simple

statement that is treated as a full paragraph, namely: "Each number represents a *definite degree* of acidity or alkalinity." In context, the statement is correct; each number has the meaning of each pH value. However, the almost telegraphic style may please some readers and confuse others.

More advanced concepts are introduced in the following sections. The headings are: "The Importance of pH in Industry," "Essential pH Theory," "Colorimetric Methods of pH Measurement," "Electrical Methods of pH Measurement," "More about the Meaning of pH," and "Acidity and Non-Aqueous Solutions." Each section is written in the style established in the beginning, and many show the same lavish use of photographs, diagrams, and colored pictures. For example, a full page is devoted to a colored drawing of two bottles and three tumblers arranged to show that bromo thymol blue is yellow in acetic solutions, green in water, and blue in alkaline solutions. The net result of this approach to the subject is suggestive of a display in one of the better popular magazines rather than a standard reference book, and for this reason *The Book of pH* seems to be an excellent supplementary presentation for beginning students who may lack a "feel" for the subject because of the lack of extensive laboratory experience.

The absence of references to the literature removes any lingering hope that *The Book of pH* may serve as a serious reference work. However, its wealth of simple exact definitions, descriptions, and drawings lifts it well above the standards of most popular science writing. The generous use of drawings and photographs accounts for the relatively high cost per page and amply justifies the purchase of this book by pharmacy libraries, especially where facilities are available for placing it on display from time to time. Your reviewer has found it to be a valuable teaching aid when it is allowed to remain open on a central table in the laboratory during regular sessions devoted to beginning analytical chemistry.

Although the author has elected to write for beginners, it is evident that he is well informed and has taken pains to avoid scientifically incorrect statements and to include all of the essential data required by a well-educated person who happens to be poorly prepared in the fields of chemistry, physics, and mathematics, but who needs to make use of the subject in his work. However, allowance must be made for a few inaccuracies; for example, the glossary contains the statements: "The density of a substance is the ratio of its weight to its volume," and "*Tincture;* another name for a solution, often used in pharmacy."

The appendices include an atomic weight table, a four-place table of common logarithms prefaced by a two-page treatise on their meaning and use, an elementary discussion of the decimal system, an evaluation of the factor, 2.303 (RT/F), for several temperatures up to 40°, a table of buffer solutions for potentiometric measurements, a table of salt effect corrections for eight common indicators, and discussions of the protein effect and the colloid effect. These offerings round out the presentation, making the book acceptable as a text or reference for highly specialized courses dealing with the applications of pH measurement. However, in the opinion of this reviewer, *The Book of pH* is most valuable as an auxiliary teaching aid rather than as a textbook or reference source.

Frank M. Goyan
University of California

Electrophoresis: Theory, Methods, and Applications, Milan Bier, Editor. Academic Press, Inc., New York 3, New York, 1959. xx+563 pp., 183 figs., 62 tbls. $15.00.

The title of this book describes its contents adequately; or if a more detailed title were desired, we might suggest "The Physical Chemistry of Electrophoresis and Its Applications to Biological Systems." It is a surprisingly well-integrated book considering the fact that its eleven chapters were written by ten authors or pairs of authors. To the reviewer's knowledge, there is no book in English of the same scope and coverage. It appears to cover the fields of electrophoresis rather completely, the main emphasis being on the (Tiselius) moving boundary method, but with appropriate discussion of the other methods and techniques.

A brief introduction by Arne Tiselius is followed by a theoretical chapter on charge distribution in colloidal solutions based on the interionic attraction theory. It is reminiscent of the style and content of the monograph of Verwey and Overbeek on lyophobic colloids, but contains much new material, particularly on the double-layer capacity concept and references to ion distribution around polyelectrolytes. The emphasis is on those subjects of particular importance to electrokinetic phenomena.

A second chapter on basic theory covers acid-base equilibrium in protein solutions from two principal points of view, viz., (1) electrostatic models applying the Debye-Huckel theory (principally via Kirkwood's 1934 paper), and (2) straightforward thermodynamic analysis of the ionic equilibria and titration curves. The chapter closes with a review of experimental titration curves for selected proteins. The topics are developed with considerably more rigor than one would ordinarily expect to be useful to workers in the clinical and biological fields.

Chapters 3 and 4, both by L. G. Longsworth, bring together that author's sound ideas on theory and technique in moving-boundary electrophoresis. It includes discussion of the optics of both the Schlieren display and the interference fringe methods, with a comparison of the two as to precision and ease of interpretation.

Chapter 5 is a review of methods and techniques in paper electrophoresis and includes a brief theoretical section.

This is followed by a chapter on "zone electrophoresis in various types of supporting media," with the primary concern the applicability and complications of support materials. The last chapter of the book returns to this subject with a detailed review of methods and results.

The editor has contributed a chapter on the separation techniques in unsupported electrophoresis, and includes discussions of electrophoresis convection, force-flow techniques, density gradient methods, and brief mention of pH gradient.

The thread now moves back to moving-boundary electrophoresis with a discussion of the techniques and results with protein solutions. In the main, this chapter is descriptive of technique and results, and includes sections on the complications due to various interactions and reactions at the boundary.

Chapter 9, entitled "Clinical and Physiological Applications of Electrophoresis," describes the results of moving-boundary studies on plasma and other physiological systems, both normal and pathological. This chapter contains a brief section on the hemoglobin classification studies of Pauling, Itano, *et al.*, but does not discuss the genetic interpretation.

A chapter on the application of electrophoresis to bacteria (and other cells) and viruses contains a fine discussion of the microscopic method of direct observation, as well as the numerous methods useful for viruses. It concludes with a review of recent research.

As can be seen, the book contains a variety of subject matter on almost all aspects of electrophoresis. While there are few omissions topic-wise, some topics are only briefly mentioned, but where this is true appropriate references are given. In spite of its diverse sources, this reviewer feels that it gives a very good over-all view of the subject of electrophoresis, and that it deserves a place on the reference shelf of every laboratory where electrophoretic methods are used.

The style is fairly uniform, and, though there are numerous examples of trivial repetition, there are no serious cases. There is a complete author index, and the subject index has a few, but no serious, omissions. Misprints are almost absent.

There is an abundance of figures and tables illustrative of method and results, and the layout and typography are attractive.

L. Dallas Tuck
University of California

Psychotherapeutic Drugs, Ashton L. Welsh. Charles C. Thomas, Springfield, Illinois, 1958. xiii+139 pp. $4.75.

This is a small, well-organized volume. The author has brought together in a very compact format information concerning eighteen psychotherapeutic agents. Throughout, the presentation reflects a careful and rather extensive review of the literature with emphasis on dermatology. The attraction of the book is greatly enhanced by the author's reporting the results of his own investigations.

The psychotherapeutic agents considered in the book are organized under the following five sections: "The Phenothiazines"; "Rauwolfia—Alkaloids and Fractions"; "Substituted Propanediols"; "Diphenylmenthane Derivatives"; and "Ureides and Amides." For each of the drugs considered the structural formula is presented along with very brief statements relative to the development and chemistry. In each instance this is followed by the pharmacologic actions of the drug; the administration and dosage; general clinical uses; specific dermatological uses; and the toxic effects and side reactions.

The pharmacologic actions of the psychotherapeutic agents are adequately stated. Both human and experimental animal responses are given. The statements pertaining to the modes of action of the drugs emphasize the existing need for more information regarding the anatomy and chemistry of the central nervous system involved.

All physicians would find this a handy reference for dosages for adults and children whether ambulatory or hospitalized. Mention is made where applicable of some side actions that might occur upon administration of the drugs. Very little comment is made, however, concerning the possible development of tolerance or habituation.

Particular attention has been devoted to the usefulness of these agents in the treatment of the many and varied dermatological conditions. Extensive and elaborate accounts are given for five drugs which the author and co-workers have investigated clinically. These accounts include data concerning dosage, medicinal incompatibilities, unusual reactions, and precautions. In addition, detailed descriptions are presented of the dermal reactions that occur following the administration of chlorpromazine, promazine, reserpine, and meprobamate. Other toxic effects and side reactions are listed in a very orderly manner for each of the eighteen drugs. This wealth of material supported by an excellent bibliography is the highlight and most valuable aspect of the book.

In the reviewer's opinion the book particularly meets a need for compilation of just such toxicological information concerning several of the frequently prescribed psychotherapeutic agents. For this reason alone the book would be a useful reference in the pharmacy library.

Richard K. Mulvey
Wayne State University

Polymers and Resins, Their Chemistry and Chemical Engineering, Brage Golding, D. Van Nostrand Company, Inc., Princeton, New Jersey, 1959. 744 pp. $15.00.

In a single volume, Dr. Golding has brought together fundamental concepts of the chemistry of polymer and resin formation and a systematic review of their manufacturing and fabrication technology.

The purpose of the book is twofold: (1) to serve the needs of students for a textbook

in the subject, and (2) to serve as a reference work for researchers.

After two short chapters introducing a terminology admittedly not universally accepted in which functionality and polymer formation are discussed and illustrated, various typical mechanisms and chemical reactions are illustrated for polymer formation. The first fifth of the book is completed with discussion of the elementary physical properties useful in the characterization of polymers and a general discussion of characteristic polymerization methods. A later chapter on the effect of structure upon mechanical behavior tucked in between lengthy treatments of manufacture and fabrication completes the more theoretical part of the book.

The major part of the book is devoted to the technology of manufacture and fabrication of polymers and resins. Manufacture is treated systematically starting with natural products and progressing through synthetic condensation and addition products. Fabrication is discussed by general method of forming plastic shapes—molding, extruding, etc.

The almost limitless numbers of applications are classified and illustrated with selected representative examples to complete the book.

The book is thoroughly systematic and liberally illustrated; key secondary references are cited in preference to voluminous primary references. Anyone interested in polymers and resins will find this a welcome addition to his library.

Douglas S. Chapin
University of Arizona

Handbook of Toxicology, Volume III, Insecticides, William O. Negherbon. Prepared under the direction of the Committee on the Handbook of Biological Data, Division of Biology and Agriculture, the National Academy of Sciences, the National Research Council. W. B. Saunders Company, Philadelphia, Pennsylvania, 1959. xxv +853 pp. $14.00.

Sponsored by the United States Air Force this compendium attempts to bring together quantitative, tabular, and comparative data dealing with the toxicity of insecticides and certain ancillary substances such as miticides, insecticide synergists, and repellants.

The book is divided into 188 sections. Of these, 164 concern individual, specific insecticides or ancillary agents. The remaining twenty-four sections deal with general topics or treat collectively certain properties and aspects of well-defined families of related compounds which show broad similarities of chemical structure and mode of physiological and pharmacological action.

Drawn up as a simple outline text the book combines tabular, semi-tabular, and textual methods, depending on the nature of the data presented. This procedure allows the author to use marginally indicated sources which refer to over three thousand references listed in the bibliography. Data have been gathered almost entirely from published sources and are complete through 1957. Supplemental data, although not always in correct sequence, are added to the various sections through the end of February, 1958.

The selection of a relatively few compounds from the thousands which have been synthesized and tested was in itself a monumental task. The criterion followed states that a substance, on the basis of tests, must be an effective insecticidal agent either in general use or in economically significant specific use, or must have qualified in the immediate past or give evidence of being about to attain such usefulness.

Individual sections of the book as well as general sections are presented in alphabetical order. Compounds are listed by their most common names when they reached currency of use, even if such designations are trade names. In the absence of current common names, strict chemical designations are used. Such a listing has several readily apparent disadvantages including the fact that families of related compounds are not grouped together. The disadvantage of such a system is partially overcome in the index where all available designations for any compound are listed alphabetically with appropriate cross-references.

A generally consistent form has been used in each of the various sections for the presentation of data. Following the title name of an insecticide, the listing of its synonyms, its structural formula, and molecular weight, a section headed "General" gives generalities concerning the substance, its history, special abilities or disabilities it has shown in use, special warnings and precautions, etc.

Directly following the above, physical and chemical data concerning a compound are given. These may include odor, taste, physical state, melting point, solubility, stability, etc.

The last general heading "Toxicological" covers data concerned with the toxicity, quantitative and qualitative, mode of action, biochemical, physiological, and pharmacological properties of the compound. For the most part this section has been subdivided into three parts covering: "Toxicity for Higher Animals"; "Phytotoxicity"; and "Toxicity for Insects." Quantitative toxicological data under these sections are presented in tabular form, and special stress is given under the general topic heading to facts and indications on hazard or toxicity for wild animals and for useful and beneficial insects.

Although an excellent work in its field, the chief usefulness of this book would seem to lie in the fields of agriculture or epidemiology as well as to the manufacturer of insecticides, and its applicability in the undergraduate pharmacy library would be considerably limited. Although the book does give a fairly complete coverage, the section on toxicity to higher animals, including MLD'S, LD50's, and symptoms of acute and chronic toxicity, drugs and procedures for antidoting are all but wholly ignored.

Byron A. Barnes
St. Louis College of Pharmacy and Science

Handbook of Toxicology. Volume IV: Tranquilizers, prepared under the direction of the Committee on the Handbook of Biological Data, Division of Biology and Agriculture, the National Academy of Sciences, the National Research Council. Rudolph M. Grebe, Editor. W. B. Saunders Company, Philadelphia, Pennsylvania, 1959. viii+120 pp. $4.00.

The *Handbook of Toxicology* is, at this writing, composed of five volumes. They are: *Volume 1. Acute Toxicities of Solids, Liquids, and Gases to Laboratory Animals; Volume 2. Antibiotics; Volume 3. Insecticides; Volume 4. Tranquilizers;* and *Volume 5. Fungicides.*

Volume IV: Tranquilizers, therefore, is the fourth volume of the *Handbook of Toxicology* series and the eighth of a continuing series of publications which began in 1949 under the general direction of the Committee on the Handbook of Biological Data. Each of these publications is predominantly a collocation of information which is useful to the biologist, particularly to the pharmacologist, the biochemist, and the physiologist. The information in Volume IV was supplied by ten contributors representing seven pharmaceutical manufacturers. The analysis and compilation of data were done by Maxwell Gordon and R. F. J. McCandless, of the Smith Kline & French Laboratories.

This volume of the *Handbook* presents the toxicology, pharmacology (man and animal), clinical indications, site and mode of action of twenty-six "tranquilizers," including bibliographical references. Each compound is identified by its generic, chemical, and trade name; its molecular and structural formula; and by its physical and chemical properties. In addition to the names under which compounds appear, the index lists commonly used alternative names, synonyms, proprietary and trade names so that it may serve as a cross index.

This is a unique publication in that it presents a neat, nicely tabularized survey or summary of the data and literature relevant to these drugs. There are other colligations of information on psychotropic drugs, such as *Psychopharmaca,* a bibliography of psychopharmacology, which was compiled for the Psychopharmacology Service Center, National Institute of Mental Health, by Dr. Anne E. Caldwell. *Volume IV: Tranquilizers,* although not as comprehensive as *Psychopharmaca* where bibliographies are concerned, has the distinction of concisely and authentically summarizing the data which answer high frequency questions about these representatives of this new class of drugs. The bibliographies on the twenty-six "tranquilizers" surveyed are, of course, more current, but, as one might expect, publications of this nature become outdated almost as soon as they are published.

I expected to find a more exhaustive survey of the toxicological literature on these compounds so that it might justify its place in a handbook of toxicology. However, the toxicity data presented are practical and designed to be most useful to the clinician and the pharmacologist.

Only a few of the many compounds that may be classified as psychotropics have been chosen. These include the widely used "tranquilizers," and drugs of ancillary usefulness; for example, drugs that are used to relieve the extrapyramidal symptoms or neurological by-effects common to many phenothiazine derivatives with a piperazinyl group in the ten-position side chain and referred to as antiparkinsonian drugs. An antihistaminic and an antipruritic appear to have been included because they are phenothiazine derivatives and not for their efficacy as "tranquilizing" agents.

The authors discuss, in their introduction, the difficulties encountered with terminology in attempting to classify these drugs. Admittedly, this is getting to be a persistent and perplexing problem, and they demonstrate it by making no attempt to classify these compounds in any way.

Volume IV: Tranquilizers should be a useful addition to every library servicing the biological sciences. It represents the fourth volume of a continuing series of now five volumes of the *Handbook of Toxicology,* an important contribution prepared under the aegis of the National Academy of Sciences, National Research Council.

George J. Cosmides
Psychopharmacology Service Center
National Institute of Mental Health

Mechanisms of Hypersensitivity, Joseph H. Shaffer, Editor, Gerald A. LoGrippo, and Merrill W. Chase. Little, Brown, and Company, Boston, Massachusetts, 1959. xx +754 pp., illus. $18.50.

An international symposium, sponsored by the Henry Ford Hospital, was held in Detroit March 27-29, 1958. This report of the meeting includes the papers of sixty-five men noted for their work in the field of hypersensitivity, along with an additional fifty-seven discussants. Publication of reports of symposia, frequent in recent years, brings meetings to your front door for perusal under optimum circumstances.

Twelve major topics are discussed: The heterogeneity of antibodies, their detection, the effects of antigen-antibody complexes, permeability, the complement in allergy, autoantibodies, delayed reactions, lack of responsiveness to antigens, tolerance of tissue, hormones, the role of acid-fast microorganisms, and factors concerned in allergic responses. The banquet speech alone, by A. Ashley Miles, of London, is almost worth the price of the book. With high good nature and a few jokes, he makes some cogent remarks about histamine which suggest that its role, and perhaps by implication all the factors assigned specific roles in hypersensitivity, are in some danger of oversimplification.

Only heroic measures by editors can make any sort of continuity in a book of this sort, and it is false. The experts are presenting

their own ideas, and they would not be experts if they did not have ideas of their own. There are different approaches, conflicts in ideas, and vigorous monovalent sponsorships of a number of mechanisms. Beyond any doubt, however, hypersensitivity itself, with all its vagaries, is a topic currently in high repute, one about which more is being learned and about which no man can now say that it will come to equilibrium at a certain level. Presumably many things are now called hypersensitivity which will in time be found to belong in other categories.

In a general sense, the lack of clinical descriptions of hypersensitivity to which purported mechanisms are related seems a weakness of nearly all the reports. The evidence of excessive sensitivity to some foreign substance is the starting point for any study of mechanisms, and to imply the mechanisms of a phenomenon without ironclad proof that it is related to the phenomenon is hardly proper. This is particularly pertinent in this field, since the purported mechanisms are virtually all phases of reactions between antigens and antibodies, as, (a) the range of states, said to be states of hypersensitivity, suggests more far-reaching complexities, and (b) in modern terms a similar book on the mechanisms of immunity would be remarkably similar. That the story of the mechanisms of hypersensitivity is not completed is certain, but knowledge is being advanced, and readers of this volume are not pushed around, but are led into various paths, the perfections of which they may judge for themselves.

Max S. Marshall
University of California

Neuropharmacology—Transactions of the Fourth Conference Sponsored By The Josiah Macy, Jr. Foundation. Harold A. Abramason, Editor. Josiah Macy, Jr. Foundation Publications, 16 West 46th Street, New York 36, New York. 285 pp., 48 figs., 12 tbls. $5.00.

This is the fourth of a series of conferences dealing with neuropharmacology that have been sponsored by the Josiah Macy, Jr. Foundation. Preceding the actual presentation of the transactions there is an explanation of the purpose of the Josiah Macy, Jr. Foundation by Frank Freemont Smith, M.D., and of what the Foundation hopes to accomplish by these conferences. This explanation should be read so that the reader will understand the style of presentation which follows in the transactions. These conferences are limited to twenty-five members "selected to represent a multi-discipline approach to some urgent problems in the field of medicine and health." There were four papers presented in this conference and they are as follows: "The Effect of Respiratory Poisons and Anoxia on Siamese Fighting Fish in Relation to LSD-25 Reaction," presented by Harold A. Abramason; "Clinical Studies with Taraxein," presented by Robert G. Heath; "'Stop' and 'Start' Systems," presented by John C. Lilly; and "Some Relations Between Chemical Structure and Physiological Action of Mescaline and Related Compounds," presented by Gordon A. Alles.

Following each of the presentations there is a transcript of the group interchange that follows, and a list of references. There is an extensive index at the end of the book which is quite valuable for finding isolated points that may be of interest. As stated in the preface of the book, the style of publication of these Transactions may be criticized. It should be remembered that these conferences are apparently very informal, and the participants may interrupt at any time during the presentation. This sometimes leads to confusion for the reader, and at times the material presented by participants seems to get out of context with the subject matter being presented. There is actually no summary *per se* for each of these presentations so this may be a minor criticism of the book, but those interested in the material will not find this a drawback to the book. In spite of the difference in style of presentation, this book is a valuable asset in the field of neuropharmacology. This book would be useful strictly as a reference text and should be in the pharmacy library. Transactions of the three conferences on neuropharmacology preceding this are still available and should be obtained to make the series complete. All of the papers are well presented and besides presenting a great many facts and results of research they also pose a great many questions raised in the discussions which would give a research-inclined person in this area a great deal of food for thought and speculation.

Marcus W. Jordin
University of Arkansas

Curare and Curare-like Agents, D. Bovet, F. Bovet-Nitti, and G. B. Marini-Bettolo, Editors. Elsevier Publishing Company (Distributors for The United States of America: D. Van Nostrand Company, Inc., New York), 1959. xi+478 pp. 207 figs., 65 tbls. $15.75.

This book is a collection of papers and communications presented at a symposium held in Rio de Janeiro in August of 1957, and of the forty-six papers presented in the book, eleven of them are in French. It is of special interest because it brings together in the curare country itself all those who have devoted themselves to the study of curare. An excellent job has been done in summing up our present knowledge in a field that for almost 500 years has never ceased to stimulate the curiosity of scholars.

The book is divided into five divisions namely:

I. Ethnographic Problems Connected with the Preparation and Use of Curare by South American Indians
II. The South American Loganiaceae and Menispermaceae as a Source of Curarizing Alkaloids
III. The Chemistry of Naturally Occurring Curarizing Alkaloids

IV. Pharmacological and Physiological Aspects of Curare and Curare-like Drugs
V. Clinical Applications of Curarizing Agents

The papers presented in the various sections cover the history of the drug and its use by the Amazonian Indians, the botanical knowledge of curare, the chemistry of the alkaloids and structure activity relationship of curare-like drugs, the mechanism of action, specific antagonists, the synthesis of substances having a curarizing effect, and, lastly, the therapeutic applications of the drug in surgery, Parkinsonism, and poliomyelitis.

All in all this book is an excellent reference with a voluminous and diversified bibliography, and the reader will be in a position, through the original work of foremost specialists, to grasp in its entirety a problem about which an enormous amount of knowledge has been accumulated.

Hugh C. Ferguson
Ohio Northern University

Textbook of Toxicology, Kenneth P. DuBois, and E. M. K. Geiling. The Oxford University Press, New York, New York, 1959. x+302 pp., 2 figs., 21 tbls. $6.50.

This new, multi-faceted, concise, and clearly written text presents the essentials of toxicology down to the cellular level primarily for a course for medical and advanced undergraduate students in biology and pharmacy. It embodies a number of years of teaching and research experience in this field.

Following a chapter on historical development, the general principles of toxicology are presented. It would seem advantageous to introduce here the general principles of treatment (p. 29) by stressing the importance of diagnosis and aids afforded by the various signs and symptoms and by the environment, now, in part, deferred to general considerations in toxicological analysis (p. 287). Considerable attention is paid to the medicolegal aspects of toxicology, emphasizing the need for expansion of local and state regulation and greater uniformity among laws dealing with drugs and poisons. Three chapters are devoted to air-borne poisons under general principles, gases, and dusts; the gases include a series of common ones as well as war gases, some of which are discussed in considerable detail. The dusts are classified as to source and various syndromes are listed. Special attention is given to carcinogenic dusts. In relation to dusts, the reviewer wishes to refer to the interesting work of Jessen on air-borne bacteria, important in controlling occurrences of infections in groups of children, patients, and workers (Jessen, C., Luftbårne Mikroorganismer Forekomst og Bekæmpelse (Airborne Micro-organisms Occurrence and Repression) with English summaries; G. E. C. Gad, Copenhagen, pp. 282, 1955). Additional chapters take up corrosion and phosphorus and the metals. Special consideration is given to radiation hazards with clarification of terminology; radioactive isotopes are briefly discussed and listed in Table X, p. 176, which might advantageously include C-14, now widely employed in research.

One chapter takes up alcohol and other industrial solvents; based upon the data contained in Table XI, the statement on p. 186 that the accident rate is higher in automobile drivers whose blood alcohol is 150 mg. per 100 cc. of blood "or more" might have been more accurate if reworded to read "or even considerably less." Disulfiram, the official name for antabuse, should be given, and obviously, in Table XII, the 100 cc. for methyl alcohol should read 10 cc. A short chapter deals with nitro and amino compounds, including explosives, and is followed by one discussing the various types of pesticides and the multiple health problems in dealing with these; it will help the reader to have the individual herbicides (p. 230) listed in the index. Food poisoning is combined with plant and animal poisons in Chapter XIII and is followed by a thirty-five-page chapter on household chemicals, toys, art and hobby supplies, cosmetics, and drugs. To keep the book within reasonable limits, the drugs are taken up under half a dozen headings, and the field of drug toxicity manifested during therapeutic procedures relegated to textbooks of pharmacology. Warnings of the dangers of promiscuous use of many drugs are given as well as their relative importance in accidental poisoning. The final chapter deals with eight phases of toxicological analysis, including the matter of grouping poisons for purposes of identification and interpretation of the analytical results.

This text should serve well and have a wide acceptance as a foundation for a separate course in toxicology for pharmacy students. According to the authors, the pharmacist is "frequently called upon for advice concerning the dangers associated with the use of various chemical agents" and is "in an excellent position to educate the public concerning the hazards and the benefits resulting from the use of pesticidal agents," hence he cannot be too well informed in this field.

Harold G. O. Holck
University of Nebraska

Laboratory Guide in Pharmacology, H. G. O. Holck, T. S. Miya, N. W. Dunham, and G. K. W. Yim. Burgess Publishing Company, Minneapolis, Minnesota, 1959. iv+115 pp. $3.50.

This manual apparently replaces the *Laboratory Guide in Pharmacology for Pharmacy and Dental Students.* Those who are familiar with the earlier manual will find a great many improvements and changes. Pharmacology instructors in schools of pharmacy will be pleased to note that the section formerly devoted to pharmaceutical preparations for dental students has been deleted.

A number of completely new experiments have been added. For example, drugs such as ataraxics, narcotic antagonists, and newer muscle relaxants are now covered in simple, straightforward experiments. A number of

the less-effective experiments in the earlier manual have been dropped. In general, the choices of experiments and drug types are generally excellent for providing the pharmacy student with a comprehensive picture of drug action. Probably the most significant feature of this manual in comparison with others of this type is that the individual experiments are obviously designed for the average pharmacy school. Complex equipment is kept at a minimum and the animals employed are principally rats, frogs, rabbits and guinea pigs. It should be noted, however, that while the authors emphasize that the experiments are designed to require a minimum of animal facilities, they have not made effective use of the mouse as an experimental animal. In the experience of the reviewer, most of the experiments in which rats have been employed can easily be changed to use the mouse.

A number of minor changes in the manual should make it a more effective teaching aid. Experiments are now arranged in a logical sequence according to the usual pharmacological classification. All of the experiments are written with greater clarity, and it is now much easier to follow the intent of the authors. The paper and printing are also greatly improved in quality .

Additional features of interest include an appendix listing the more effective films of a pharmacological nature and another which gives a brief summary of the principles of biological variability and bioassay.

This laboratory manual is recommended as a reference for all pharmacy schools and can be used partially or in its entirety by most undergraduate pharmacology laboratories.

Duane G. Wenzel
The University of Kansas

A Synopsis of Pharmacology, with Special Application to Dentistry, V. C. Sutherland. W. B. Saunders Company, Philadelphia 5, Pennsylvania, 1959. viii+267 pp., 7 figs., 8 tbls. $4.00.

This book was not designed as a complete textbook of pharmacology. As the title indicates it is an outline or synopsis, designed as an introduction for the beginning student.

The topics considered are: introduction to pharmacology, introduction to agents affecting the central nervous system, sedatives and hypnotics, anticonvulsants, ethyl and methyl alcohols, ataraxics, introduction to the autonomic nervous system, sympathomimetic and sympatholytic agents, parasympathomimetic and parasympatholytic agents, neuromuscular agents and muscle relaxants, cardiac drugs and vascular agents, analgetics, general anesthetics, local anesthetics, histamine antagonists, local anti-infectives, sulfonamides and antibiotics, hematics, hormones, and prescription writing. The author has also included a very brief review of the relevant physiology and pathology "as experience with several student groups has suggested." The older historical therapeutic agents have been omitted, and only those drugs which have current therapeutic application are included. Where related pharmacologic agents are too numerous to treat individually, they are listed under their appropriate therapeutic category by generic and trade name.

The data are presented in typical outline format, with the chemical formula; pharmacologic effects; absorption, metabolism, and excretion; toxicity; and uses given. General discussion and fundamental and basic pharmacodynamic concepts are omitted. However, for those who may desire more extensive details, a comprehensive list of references is provided at the end of each chapter.

This book is recommended as an excellent review of pharmacology for practicing pharmacists, advanced students, beginning dental students or others who may desire abbreviated pharmacologic information. It should not, however, replace the several pharmacology texts which contain more detailed information.

Robert D. Gibson
University of Nebraska

Diagnostic Biochemistry, Halvor N. Christensen. Oxford University Press, New York, New York, 1959. ix+291 pp., 47 figs., 3 tbls. $6.50.

Diagnostic Biochemistry is a worthy attempt on the part of the author in the presentation of the basic principles and precepts of the relatively new science of "clinical chemistry." However, the book cannot be lauded for this attempt but for another. Dr. Christensen endeavors to stress to the student the use and importance of the library through a series of questions at the end of each chapter, chosen pertinent to cited literature in many instances, which are correlated with the principles discussed in each chapter. Herein lies the strength and value of this book. The author constantly emphasizes the literature and reminds the reader to utilize it in order to keep abreast in the field of clinical chemistry as a possible aid to the solution of problems of diagnostic difficulty. He doesn't offer this chemistry as a crutch in making diagnoses but as an aid. He points out the value to the accumulation of pertinent data on patients in ultimately reaching a diagnostic decision. It must be inserted here that this book does not systematically set down a series of chemical results which are expected to be found in disease states; these are not to be found in this volume.

The selection of topics discussed in the book is logically organized and written in a clear, conservative style. The author treats such a multiplicity of subjects that it is impossible in a book of this length for him to discuss each topic in detail. The references are selected carefully and utilized quite ingeniously in critically analyzing data presented in the literature through the medium of questions confronting the reader as problems throughout the text. In most cases, the papers referred to must be consulted for details if any worth is to be gained from this book.

This is not to imply that this book may be used for its bibliography; such is not the case. The literature cited by the author is used only to spur the student into solving problems of a clinical chemistry nature.

It is felt that *Diagnostic Biochemistry* is not intended to be used as a textbook since it is presumed by the author that the reader has an adequate understanding of the principles of biochemistry. In consideration of the above, advanced students in biochemistry and clinical chemistry, students in the clinical years of medical school, interns and residents, and, perhaps, exceptional student and graduate medical technologists will find this book a useful and stimulating work. As a brief consideration of the present status of knowledge in the field of clinical chemistry the book should aid in stimulating further interest and growth of the field.

Richard H. Gadsden
Medical College of South Carolina

Steroids, Louis F. Fieser and Mary Fieser. Fourth Edition. Reinhold Publishing Corporation, New York, New York, 1959. vi+945 pp., 648 wax engravings, tbls. $18.00.

Steroids is the new title of the well-known monograph, *Natural Products Related to Phenanthrene,* by the same authors. The Third Edition (1949) was a complete rewriting of the book, and, in spite of the deletion of certain sections, was double the size of the Second Edition. The Fourth Edition appearing a decade later also is characterized by the further deletion of the chapters on quinones, morphine and related alkaloids, and resin acids and by a complete rewriting of the material. The Fourth Edition is devoted entirely to steroids and those alkaloids having a typical steroid nucleus, hence the change in title.

Abbreviations have been used throughout the text, and these are collected in a four-page glossary under headings, such as: solvents, reagents, groups, constants, trivial names, and shortened abbreviations for the names of more than thirty journals. There has been a nearly complete changeover to the use of arabic numerals to designate the compounds in the charts in place of the Roman numerals of the previous editions.

The subject matter is organized under twenty-two topic or chapter titles. Some are specific, as for example, Vitamin D, estrogens, androgens, progestogens, while others are general in character as, orienting survey, oxidations, enes and ols, ketones, displacements and rearrangements. A chapter is devoted to physical methods of characterization which have been applied so successfully to the steroids within the last decade, and another is devoted to the biosynthesis of cholesterol. In many chapters, a review of early work, frequently reinterpreted and corrected in the light of more recent studies, serves as an introduction to the subject. The chapters are amply illustrated with charts of graphic formulae of important compounds, of reaction sequences leading to proof of structure by degradative methods, by partial or total syntheses, or by inter-conversions. Extensive tables of physical data for many of the compounds are presented. For key compounds throughout, and particularly at points where clarification is provided, conformational structures are drawn. Reaction mechanisms are interpreted in the light of modern electronic concepts, steric effects, and/or the limitations implied by the conformational formulas.

Of particular interest to those in pharmaceutical fields are the many compilations of physiological activity and correlations with structural changes as they apply to Vitamin D, the estrogens, progestogens, androgens, adrenocortical hormones, and cardiotonic principles.

Even though the monograph carries the names of only two authors, it is the result of collaborative effort since more than sixty individuals prominent in the field of steroid work in the United States and abroad have reviewed parts or all of the manuscript and are cited in the preface. The broad personal contacts of one of the authors permits the inclusion of introductory historical information otherwise widely scattered in the literature or not appearing at all. Similarly, it has been possible to include studies in press or just now appearing in the literature. The cut-off date is given as February-March, 1959.

In a subject as extensive as steroids has become, it is almost inevitable that some omissions would occur. For example, a recent investigation of the effect of the side chain on the Vitamin D activity of suitably irradiated 7-dehydro compounds (DeVries and Backer, *Rec. trav. chim.,* 1950 to 1952) is not included in the discussion of the relation of structure and antirachitic activity on pp. 135-136, nor is the work of Milas on simpler analogs of Provitamin D or on derivatives substituted in the 3-position with a conjugated triene system (*J. Am. Chem. Soc.* 1957 to 1959).

In general the writing and editing has been carefully done. Occasionally, confused statements appear as on p. 478 " . . . it (Premarin) has a certain hemostatic action and tends to prevent blood clotting, . . . ", or on p. 727 "Digitalis, a preparation made by extraction of dried seeds and leaves of purple foxglove, . . . ". The typography and binding of the book are good.

Certainly, all pharmacy college libraries should have this comprehensive treatise, as should all those staff members interested in pharmaceutical chemistry. It is an admirable reference work and would also be useful in graduate courses in pharmaceutical chemistry.

Melvin F. W. Dunker
Wayne State University

Sensitivity Reactions To Drugs, M. L. Rosenheim and R. Moulton, Editors. Charles C. Thomas, Publisher, Springfield, Illinois, 1958. x+237 pp., 72 figs., 24 tbls. $7.00.

This book consists of one general discussion and seventeen articles by a collection of symposium participants reputedly interdisciplinary in background but, judging by their articles, quite clinical in interests. As is true of most

symposia the articles are mainly reviews of personal research problems, the majority of which have already appeared in print.

The first seven papers, of which the first is a fine general review by Discombe, are concerned mainly with the clinical problems of hemolytic reaction to drugs. The roles of such drugs as chloramphenical, dilantin, primidone, phenobarbital, chlortrimeton, sulfonamides, aminopyrine, arsphenamine, etc. in producing megaloblastic anemia, thrombocytopenia purpura, agranulocytosis, and bone marrow aplasia are discussed from the clinical point of view. Four papers deal with the relationship between antigen-antibody reactions and the production of drug sensitivities.

A number of papers repeat what seems to have been an underlying theme of the symposium: a few thousand words to "indicate the direction of future research." Such a paper was one with the very interesting title "Chemical Structure and Pharmacodynamic Action in Relation to Drug Sensitivity." However, in the first paragraph the author concludes that "with existing knowledge no correlation was possible." He then takes eighteen pages to "attempt to review the small amount of factual evidence available and, by reference to other fields, to see if there are indications of ways in which our store of relevant facts can be increased." Such misleading articles do little for the participants at the symposium and do much less for the reader of the proceedings.

Several papers and the major discussion period were devoted to evaluating methods for early diagnosis of drug reactions. One conclusion is drawn: namely that no agreement can be reached as to the true merit of blood tests in early diagnosis of drug reactions. The final three papers discussed the tissue reactions to drugs, especially tissues of the heart, arteries, and joints. One receives the impression as he reads this book that perhaps the major villain in the problem of sensitivity reactions to drugs is not the drug but the indiscriminate and unwise use of drugs by clinicians and also the willingness, if not the zealous attempt, on the part of some clinicians, to implicate drugs when numerous psychological or physical conditions might afford a far more reasonable explanation for the "drug reaction."

As is to be expected with any symposium the quality and the style of the articles vary widely, just as do the discussions which follow nearly every article. For anyone interested in obtaining an introduction to sensitivity reactions to drugs, little can be gained by reading this book other than from the occasionally good review sections (e.g.—Discombe, Rosenheim, and Davies). For the hematologist, immunologist, pharmacologist, chemist, etc. interested in this specific topic, most of what was said must be considered of review value only. To one seeking detailed information on specific drug responses, the reader would do better to consult the original literature from which most of these articles were prepared.

This book should be of interest only to those persons routinely associated with clinical diagnosis and immunologic definition of drug sensitivities. For this reason the only library with potential interest in this book would at best be the general medical library. Unlike one of the numerous symposia on psychopharmacology of which one reviewer once wrote "this volume adds too little too late," this symposium saw too much said, too soon, when too little was known.

Ralph W. Morris
University of Illinois

Textbook of Salesmanship, Frederick A. Russell and Frank H. Beach. Sixth Edition. McGraw-Hill Book Company, New York, New York, 1959. ix and 566 pp., 29 figs., 9 tbls. $6.75.

The Sixth Edition follows closely in style and arrangement the fifth edition of this standard textbook in the area of personal selling. In eighteen chapters the authors relate salesmanship to the young man, place it in our industrial economy, and describe different types of selling jobs. They discuss the salesman's personality and the importance of product knowledge. These preliminary considerations lead into prospecting and preapproach. The text then follows the familiar pattern of approach, demonstration, handling objections, the close, the departure, and the follow-through. Then a chapter on retail salesmanship is followed with a chapter dealing with sales contacts and the responsibilities of the salesman to his firm. It closes with an entirely new chapter on self-management, in which the authors embrace virtually a complete philosophy of life for the salesman, and also focus attention upon the wisest use of time.

There are eight text-films correlated with the material offered by the authors. Seven sales cases are included, five entirely new. At the end of each chapter are discussion questions and problems. This greatly enhances the value of the information to the student and serves as an aid in teaching. Although a limited number of footnote references are included, there is no collected bibliographical listing of references.

The reviewer was favorably impressed with the Sixth Edition. It has been thoroughly revised in the light of modern practice to include new application by the psychologists of their science to the selection and training of salesmen. There is limited handling of the use of motivation research. More might have been done in this area as it relates to cooperative advertising, including recent findings of psychologists.

The chapter on retail salesmanship is basic, but might have included some reference to selling in the self-service situation. The newer cases and illustrations should make it easier for continued use by teachers, although the figures could be improved.

The *Textbook of Salesmanship* is recommended for classroom use in basic salesmanship courses. Sales trainers in the business world should find it useful as a basic book.

It has value as a reference text in a specialized pharmacy sales organization course, and in pharmacy sales training programs. It should be included in libraries serving colleges of pharmacy.

The authors, both eminent in their field, should be complimented upon reaching a sixth edition, a rarity in the field of marketing, a fact pointed out even by the reviewer of the Fifth Edition.

Esther Jane Wood Hall
University of Texas

. . . we confuse size with importance, speed with progress, money with wealth, authority with wisdom, religion with theology, excitement with pleasure. We have confused training with education.

Carter Davidson, Am. J. Pharm. Ed., 12, 86 (1948)

NEW BOOKS

Advances in Enzymology, Volume 21, F. F. Nord. Interscience Publishers, Inc., New York 1, New York, 1959. v+521 pp., figs., tbls. $12.50.

Source Book of Industrial Solvents, Volume 3: Monohydric Alcohols, Ibert Mellan. Reinhold Publishing Corp., New York 22, New York, 1959. vi+276 pp., 57 figs., 57 tbls. $10.00.

Greek and Latin in Scientific Terminology, Oscar E. Nybakken. Iowa State College Press, Ames, Iowa, 1959. xi+321 pp. $5.95.

Recent Progress in Hormone Research, Volume 15, Gregory Pincus. Academic Press, Inc., Publishers, New York 3, New York, 1959. xv+504 pp., figs., tbls. $12.50.

Educators Guide to Free Films, Mary Foley Horkheimer and John W. Diffor. Nineteenth Annual Edition. Educators Progress Service, Randolph, Wisconsin, 1959. x+639 pp. $7.00 (paper).

An Introduction to Public Health, Harry S. Mustard and Ernest L. Stebbins. Fourth Edition. The Macmillan Company, New York 11, New York, 1959. xi+338 pp., 9 tbls. $4.50.

Antibiotics, Their Chemistry and Non-Medical Uses, Herbert S. Goldberg. D. Van Nostrand Company, Inc., Princeton, New Jersey, 1959. x+608 pp., figs., tbls. $15.00.

Collectanea Pharmaceutica Suecica, Volumen XIII, Kungl. Farmaceutiska Institutets Bibliotek, Stockholm, 1958. Tjänsteförsändelse från Farmacoutiska Institut, Stockholm, Sweden, 1959. 156 pp., figs., tbls.

Molecules and Mental Health, Frederick A. Gibbs. J. B. Lippincott Company, Philadelphia 5, Pennsylvania, 1959. xii+189 pp., 50 figs., 25 tbls. $4.75.

College Testing, A Guide to Practices and Programs, Committee on Measurement and Evaluation of the American Council on Education. American Council on Education, Washington 6, D.C., 1959. xi+189 pp. $3.00.

Clark's Applied Pharmacology, Andrew Wilson and H. O. Schild. Ninth Edition. Little, Brown & Company, Boston 6, Massachusetts, 1959. xii+750 pp., 164 figs., 38 tbls. $10.00.

Medical Sciences, Progress in Nuclear Energy, Volume 2, J. Bugher *et al.* Pergamon Press Inc., New York 22, New York, 1959. viii+288+XII pp. figs., tbls. $15.00.

Educators Guide to Free Filmstrips, Mary Foley Horkheimer and John W. Diffor. Eleventh Annual Edition. Educators Progress Service, Randolph, Wisconsin, 1959, viii+191 pp. $6.00 (paper).

The Viruses, Volume 2, F. M. Burnet and W. M. Stanley. Academic Press Inc., Publishers, New York 3, New York, 1959. xvi+408 pp., figs., tbls. $13.00.

Industrial Gums, Polysaccharides and Their Derivatives, Roy L. Whistler and James N. BeMiller. Academic Press Inc., Publishers, New York 3, New York, 1959. xi+766 pp., figs., tbls. $25.00.

The Human Integument, Stephen Rothman. American Association for the Advancement of Science, Washington 5, D.C., 1959. x+260 pp. figs., tbls. $5.75, Prepaid to AAAS Members $5.00.

The Clinical Evaluation of New Drugs, S. O. Waife and Alvin P. Shapiro, *et al.* A Hoeber-Harper Book, New York 16, New York. x+223 pp., 1 fig., 5 tbls. $7.50.

Orientation to Pharmacy, Henry M. Burlage, Charles O. Lee, and L. Wait Rising. The Blakiston Division McGraw-Hill Book Company, Inc., New York 36, New York, 1959. x+306 pp., 2 figs., 3 tbls. $6.95.

Microbiology Yesterday and Today, Vernon Bryson. Institute of Microbiology, Rutgers, The State University, New Brunswick, New Jersey, 1959. v+122 pp., figs., tbls. $4.00.

Elementary Teachers Guide to Free Curriculum Materials, A. P. Horkheimer. Educators Progress Service, Randolph, Wisconsin, 1959. xiv+313+33 pp. $6.50 (paper).

Advances in Applied Microbiology, Volume 1, Wayne W. Umbreit. Academic Press Inc., New York 3, New York, 1959. xi+304 pp., figs., tbls. $9.50.

Syntheses of Heterocyclic Compounds, A. L. Mndzhoian. Consultants Bureau, Inc., New York 11, New York, 1959. 71+84 pp., (Volumes 1 and 2) figs. $6.00.

The Golden Age of Quackery, Stewart H. Holbrook. The Macmillan Company, New York 11, New York, 1959. viii+302 pp. $4.95.

Antibiotics Annual, 1958-1959, Henry Welch and Felix Marti-Ibanez. Medical Encyclopedia, Inc., New York 22, New York, 1958-59. xvii+3+1107 pp., figs., tbls. $12.00.

The Johnson Recording Oscillometer, Its Use in the Study of Arterial Circulation, Carl A. Johnson. Pergamon Press, New

York 22, New York, 1959. vii+112 pp., 71 figs., 1 tbl. $5.00.

Silicones, Robert N. Meals and Frederick M. Lewis. Reinhold Publishing Corp., New York 22, New York, 1959. xi+267 pp., figs., tbls. $5.95.

The Effect of Pharmacologic Agents on the Nervous System, Francis J. Braceland. The Williams and Wilkins Company, Baltimore 2, Maryland, 1959. xi+488 pp., figs., tbls. $13.50.

Current Medical References, P. J. Sanazaro. Lange Medical Publications, Los Altos, California, 1959. 535 pp. $3.50 (paper).

Handbook of Poisoning: Diagnosis and Treatment, Second Edition, Robert H. Dreisbach. Lange Medical Publications, Los Altos, California, 1959. 474 pp., figs., tbls. $3.50 (paper).

Organic Chemistry: A Brief Course, Ray Q. Brewster and William E. McEwen. Second Edition. Prentice-Hall, Inc., Englewood Cliffs, New Jersey, 1959. xii+401 pp., 25 figs., 19 tbls., 12 charts. $7.50.

Narcotics, Lingo and Lore, J. E. Schmidt. Charles C. Thomas, Publisher, Springfield, Illinois, 1959. xiv+199 pp. $4.25.

MISCELLANEOUS

Exercises in the Evaluation of Drugs and Surgical Dressings, E. J. Shellard. Pitman Medical Publishing Co., New York 36, New York, 1959. xvi+158 pp., 24 figs. $2.10 (paper).

Series 7—Unpublished Abstracts of Articles on Pharmaceutical Subjects, A Selected Listing of Articles on Pharmacy Administration in Twelve Journals, 331-398, Clark C. Cramer and Esther Jane Wood Hall, Austin, Texas, 1959. 13 pp. $1.50 (paper).

NWDA 1958 Operating Survey, Facts on Sales, Costs and Profits of Service Wholesale Druggists, William L. Ford, Orin E. Burley, and Nancy L. Schnerr. Twenty-seventh Edition. Wharton School of Finance and Commerce, University of Pennsylvania, 1958. 45 pp. Free (paper).

Are Liberal Arts Colleges Becoming Professional Schools?, Earl J. McGrath and Charles H. Russell. Institute of Higher Education, Teachers College, Columbia University, New York 23, New York, 1958. 26 pp. $0.50 (paper).

The Liberal Arts as Viewed by Faculty Members in Professional Schools, Paul L. Dressel, Lewis B. Mayhew, and Earl J. McGrath. Institute of Higher Education, Teachers College, Columbia University, New York 23, New York, 1959. 3+68 pp., 39 tbls. $1.50 (paper).

Liberal Education in the Professions, Earl J. McGrath. Institute of Higher Education, Teachers College, Columbia University, New York 23, New York, 1959. 3+63 pp. $1.50 (paper).

Licensure Statistics (Calendar Year 1958) and Census of Pharmacy (January 1, 1959). National Association of Boards of Pharmacy, Chicago 2, Illinois. 13 pp. 11 charts. Free (paper).

British National Formulary, 1957, Second Amendment, 1959. The British Medical Association and the Pharmaceutical Press, 17 Bloomsbury Square, London W.C. 1. 3 pp. $0.05 (plus 2 cents postage) (paper).

A Directory of 3,660 16 mm. Film Libraries. Superintendent of Documents, U.S. Government Printing Office, Washington 25, D.C., 1958. 236 pp. $1.00 (paper) (Cat. No. FS 5.3:959/4).

First Aid Guide. Superintendent of Documents, U.S. Government Printing Office, Washington 25, D.C., 1958. 64 pp. Illus. $0.25 (paper) (Cat. No. A 13.36:F 51/5 /958).

Financial Statistics of Institutions of Higher Education: Statistical Summary, 1955-56. Superintendent of Documents, U.S. Government Printing Office, Washington 25, D.C., 1959. 11 pp. $0.15 (paper) (Cat. No. FS 5.4:571).

Regulations No. 5, Regulatory Taxes on Narcotic Drugs, Opium, Coca Leaves, Isonipecaine or Opiates. Superintendent of Documents, U.S. Government Printing Office, Washington 25, D.C., 1959. 106 pp. $0.35 (paper) (Cat. No. T 56.6: 5/4).

Teaching with Radioisotopes. Superintendent of Documents, U.S. Government Printing Office, Washington 25, D.C., 1959. 60 pp. Illus. $0.40 (paper) (Cat. No. Y 3.At7:2$ 11/24).

Traffic in Opium and Other Dangerous Drugs for the Year Ended December 31, 1958. Superintendent of Documents, U.S. Government Printing Office, Washington 25, D.C., 1959. 58 pp. Illus. $0.30 (paper) (Cat. No. T 56.8:958).

May we always remain a united family in the service of humanity.
Rufus A. Lyman, Am. J. Pharm. Ed., 12, 88 (1948)

AMERICAN JOURNAL
OF
PHARMACEUTICAL EDUCATION

INDEX TO AUTHORS

INDEX TO SUBJECTS AND TITLES

VOLUME 23

WINTER, SPRING, SUMMER, AND FALL

1959

INDEX TO AUTHORS

INDEX TO SUBJECTS AND TITLES